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Plastic, Facial and Maxillary Surgery —*Brown*

Root-Canal Treatment—*Crane*

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## *Original Communications*

# THE VARIED REACTIONS TO INJURY RESULTING FROM TRAUMATIC OCCLUSION

By PAUL R. STILLMAN, D.D.S., F.A.C.D., New York City

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

THE study of inflammation is a study of cause and effect. The cause, in the diction of the pathologist, is called the "injurious agent." The effect is called the "reaction to injury." Injurious agents are of three main types: mechanical, chemical and bacterial. It is one of the laws of the science of pathology that a given injurious agent will always produce the same reaction, provided it acts on the same tissue and under identical circumstances.

We have in the foregoing statement, however, the possibility of many variations. Assuming that the injurious agent in a certain series of observations is the same, it may act on several different tissues; it may vary in intensity, or its action may be modified by the coincidental action of other injurious agents. The reaction to the injury will vary according to the type of tissue being acted on, and according to the resistance of the tissue. Resistance varies according to the nourishment, elimination and metabolic activity, with reference both to the inherent characteristics of the tissue and the influence on it of the nervous system.

Traumatic occlusion has been defined; and its reaction on the teeth and their investing tissues, as observed in the clinic, has been outlined in previous writings.[1] It seems, therefore, unnecessary to elaborate on these points. In our study of traumatic occlusion, we find that it is a mechanical injurious agent. Owing to its nature, it is an agency

1. Stillman, P. R.: Traumatic Occlusion, J.N.D.A., 6:691 (Aug.) 1919.

which varies only in intensity or in the direction of the force applied. In other words, its invariable action is to produce, or tend to produce, an abnormal movement of a tooth in its socket. It varies in the amount of force and in the direction of this force. The reaction, or effect produced by this force, does not depend on variations in its magnitude so much as it does on the resistance of the periodontal tissues. But the reaction does vary with the variation and in the direction of the force applied. In other words, teeth which are, by reason of their location in the mouth, being acted on by the application of force in certain characteristic directions tend to develop similar reactions.

When we begin to study the variations in the reactions of the different tissues which may be affected by this agency, we find it necessary to explain these variations by an analysis of the complicating injurious agencies, chiefly bacterial action, and by the resistance of the tissues acted on. Only thus can we account for the diversity of abnormal and pathologic conditions, which we have been able to trace directly to traumatic occlusion as the prime and inaugurating factor. It should be understood that, in the following discussion of the effects of traumatic occlusion, we are speaking from the standpoint of many years of clinical observation. Also, in each case cited, the condition has been diagnosed as being associated with a traumatic occlusion, and when treated, resolution has been obtained through the relief of this injurious condition.

Before proceeding further with the subject, it is necessary to call attention to the fact that the mechanical stress to which we have given the name traumatic occlusion does not invariably produce injury. There are instances in which the term may thus be justly said to be misleading. It, nevertheless, has been our experience that, when present, it sooner or later does produce an effect which usually is a pathologic condition, and therefore a trauma. For the sake of accuracy, however, we should take into account those cases in which the tissues are in an apparent state of health and which have exhibited no clinical reaction to this mechanical force.

The word irritation has often been used as contrasted with stimulation, as though they were two distinct and unlike things. On analysis, however, we find it impossible, in the study of disease, to draw a sharp line between the two. A certain act may be performed and will result in stimulation. The same act, if continued and prolonged in the same manner will result in irritation. Carried still further, it may induce disease. Let us take, for instance, so simple an act as rubbing the palm of one hand on the back of the other. Continuous rubbing will, after a few moments, produce an increased flow of blood to the rubbed hand and result in a mild hyperemia. Coincidentally, there will be inaugurated all the phenomena of an incipient inflammation. If the rubbing is discontinued at this point, the effect nevertheless is one of stimulation. If the back of this hand is rubbed continuously for a longer period, the hyperemia becomes more pronounced, the phenomena of inflammation become intensified and processes leading to repair are at once set up. If continued further, infection and extensive disease may follow. There has been no change in the nature of the injurious agent, the rubbing, which produced these successive changes in the tissues. Nor can we decide at what point in the development of disease stimulation can be differentiated from irritation. This simile will also serve to illustrate the fact that differences in reaction may depend on variations in the character and resistance as well as the kind and nature of tissues acted on.

Occlusal contact of the teeth may be within the range of normal function, or it may be in excess of that range. If

it is normal or even in excess, it may produce stimulation only, or, again, it may produce irritation. In either event, this excessive force may be designated as traumatic occlusion.

It will be seen, therefore, that since the kind of tissues which are subjected to traumatic occlusion are the same from case to case, we should also take into consideration the variations in resistance of these tissues and the collateral factors which complicate the process. The tissues involved are the periodontium: the gingiva, the pericementum and the alveolar bone, together with the circulatory and nervous systems of the part and not infrequently the dental pulp. The collateral factors may be infection, chemical action of decomposing products and extraneous mechanical injury.

Variations in the resistance of the periodontium seem to center to a degree around the character and resistance of the alveolar bone. Looking over the range of cases which have come under our observation, we see at one end of the line so to speak, the type of case in which the alveolar bone is adequate in bulk and texture and capable of supporting even excessive occlusal stress. In cases having this character of bone, we find little or no bone rarefaction, little or no mobility, but slight vascular change in the gingiva and pericementum, and occasionally a distressing nerve disturbance in the more remote nerve trunks. At the other end of the line, we find the type characterized by the inadequate quality of the alveolar processes. And here the symptoms are bone rarefaction and absorption, mobility, vascular abnormality in the gingiva and pericementum, but little or no sensory pulp reaction and usually an absence of remote nerve symptoms. Between these two types of cases, we find all gradations and variations of reaction to injury and symptoms.

A citation of some of the more striking examples of cases that have come under our clinical observation, and in which localized symptoms were relieved when treatment for traumatic occlusion was given, may be both interesting and helpful, because some of them are outside the range of those which have come to be considered typical, from the standpoint of traumatic occlusion as the causative factor. Many times, dentists are consulted for treatment and diagnosis of conditions so obscure that frequently the only remedy appears at the moment to be extraction. Just as the grave hides the mistakes of the physician, so do the extracting forceps frequently obliterate all the evidence of dentists' shortcomings in diagnosis. Too often has extraction taken the place of diagnosis.

### Report of Cases

Case 1.—In one of the graduate clinics in which I was giving instruction, an Italian, past middle life, presented himself for treatment. He called attention to an enlarged gingiva, but would admit no other subjective symptoms. It was found that he had deposits in the gingival crevice and stain on nearly all his teeth. There was no clinical evidence of periodontal disease, except a mild marginal gingivitis that was accounted for as due to the presence of deposits held in contact with the marginal gingiva. What made the case interesting was an osteohyperplasia of the entire alveolar process giving the appearance of a gross overdevelopment of the gingival tissue and its supporting bone. The entire gingiva was pink, firm and very hard, and had every appearance of health. The occlusal surfaces of the teeth were somewhat worn by attrition, but only to the extent which could be expected at his age. While the departure from a normal functioning occlusal contour was obvious, though not uncommon, the change had been sufficient to induce a definite morphologic reaction in the alveolar process and gingiva. The case exhibited all of the mechanical elements of traumatic occlusion but without the classic tissue reaction which has been considered typical of this condition. The mild character of the mechanical injury relative to the high resistance together with a high resistance to bacterial action, resulted in the building up of a bony structure heavier than normal. There was no other clinical evidence of tissue disturbance.

Case 2.—Another case, quite dissimilar, but having a close personal as well as professional interest, is that of case of my youngest daughter, aged 15 years. While giving prophylactic treatment in making a routine examination for

occlusal disharmony, I found that when the mandible was given a lateral movement, in contact, the teeth and the entire investing structures, from the cuspids and including the second molar, were moved buccally to a very perceptible extent. The individual teeth were not loose. The gingival tissue was pink, firm and of normal contour, apparently in a state of perfect health. No correction of the occlusion was undertaken at that time, since there was no one point of incoordination. The occlusion would ordinarily be considered ideal, but it was, nevertheless, true that the occlusal relation due to the length of cusps was such as to impose an excessive pressure upon these teeth in the excursive movements of the mandible. However, owing to the resiliency of the tissues and the high resistance to gingival infection characteristic of the young, there was no inflammatory reaction observable.

This case, if allowed to go untreated, will terminate in one of three ways. The most common termination is the gradual onset of infection, made possible through the lowering in tone of the gingiva and alveolar structures under the constant intermittent and long continued pressure, exerted by reason of the occlusal relation. This occlusal force may in such a case be recognized as an irritation and is an actual traumatic occlusion. The next probable mode of termination is the adoption of an occlusal habit which might be termed the box-lid hinge occlusion, in which the mandible is opened and closed without lateral movement. This habit is formed through subconscious realization of the impending injury and is therefore developed as a protection against irritation. The third possible development of the case will be the natural wearing down of the high cusps through vigorous function in the presence of continual high resistance. This will bring about stimulation and the building up of a heavier alveolar structure to accommodate the excessive occlusal function, a condition similar to that described in the first case.

CASE 3.—This case had undoubtedly, at an earlier age, exhibited conditions similar to that of my daughter's case. The patient, a woman, aged 24, had always been in apparently good health. There was a generalized gingivitis and ulatrophia, which was especially pronounced along the lingual surfaces of the bicuspids and molars. The occlusion was found to be practically normal, except for the extreme interlocking of long cusps in deep sulci. When the jaw was closed with the teeth in contact and then given a lateral movement, a very perceptible buccolingual movement of all the posterior teeth took place. Pressure on individual teeth revealed no abnormal mobility.

It is a fact not generally appreciated that mobility may frequently be demonstrated through observation during occlusal function, when the affected tooth may be moved little if at all by palpation. The only difference between this case and my daughter's lay in the establishment of an asthenic infection, due to the gradual lowering of resistance through continued excessive occlusal pressure. This excessive pressure is particularly injurious when it is exerted in a buccolingual or labiolingual direction, as compared with vertical stress.

Another feature which tends to cause irritation is the intermittent application of occlusal force, as compared, for instance, with the application of pressure in orthodontic treatment. The comparison between pressure in orthodontic treatment and the pressure of traumatic occlusion is a very striking one. In orthodontic treatment, the amount of pressure is under control and can be regulated to a degree which the tissues can tolerate. In traumatic occlusion, the pressure is dependent on the occlusal relation of the teeth and is not under the control of the patient. From the physiologic standpoint, the comparison leads us into the consideration of the relation of stimulation to irritation. The steady controlled pressure exerted by the orthodontic appliance, properly adjusted, induces a stimulation which promotes the growth of bone. Traumatic occlusion, on the other hand, through the intermittent unregulated pressure, causes irritation, in most cases.

This may be followed by any of the types of infection common to these tissues. Occlusal force, which may at one

period of life result in stimulation, may be carried over the imaginary dividing line, into irritation. This change is frequently brought about in such a case by the development of an occlusal habit whose object is an effort to wear down the high cusps to a degree that will bring the buccolingual occlusal stress within physiologic bounds.

In the case just described, health was reestablished in the periodontium through grinding the cusps to an extent which would bring lateral occlusal stress within the bounds of toleration. This case, in which resistance to infection was diminished to a marked degree, represents an early stage in the type which, when more advanced, is characterized by deep pocket formation, suppuration and marked mobility.

It is often said by those who argue against the theory that traumatic occlusion is a primary cause of periodontoclasia that the traumatic occlusion has come about as a result of the migration which was itself the result of periodontal disease, inaugurated by the action of other factors. It is true that such migration may occur. But careful study of cases such as that just cited makes it clear that even when later migration has taken place, a demonstrable traumatic occlusion had existed from the time that the teeth were fully erupted.

CASE 4.—One of the most unusual cases, illustrating the varied reactions induced by traumatic occlusion, which we have observed, was that of a woman in the early forties, who had never had a day's illness and whose mouth presented every evidence of health and care. There was no abnormality of gingival tissue anywhere in the mouth. The teeth were firm and clean and their arrangement in the arches was apparently ideal, at least from the orthodontic standpoint. Her only symptom was pain. This was localized in lip and cheek, extending from the median line of the lower lip to the temporomandibular joint. There was no tenderness in the mouth, except at the point of entrance of the inferior dental nerve into its foramen. The patient, however, localized the pain as proceeding from the lower first molar. She had muscular paroxysms at intervals simulating tic, which occurred especially at meals or on accidentally touching the lip or cheek. There was also marked tenderness on the chin at the mental foramen. The roentgenogram revealed no bone absorption at the crest or elsewhere; no thickening of the pericementum, and no periapical lesion. There was evidence of calcific degeneration in the pulp of both lower first and second molars on the affected side. These teeth were not tender to percussion, nor were they sensitive to thermal change. The pulps of all the teeth in the mouth were vital. The roentgenogram revealed a considerable diffuse sclerosis below the apices of the lower first molar, external to and separate from the periodontal lamella.

The cusps of all the posterior teeth were long and pointed and without evidence of wear. The patient had evidently acquired a box-lid hinge habit of occlusion due to the unconscious realization of potential injury in lateral movement. Examination of the occlusion showed that, when a lateral movement was made, the entire mandible rode on the distobuccal cusp of the lower first molar. At the first visit, the cusps of this molar were reduced, so that the tooth was given physiologic rest in all contact relations, care being taken that no deformity or abnormality of occlusal contour was produced. Before leaving the office, the patient expressed herself as being conscious of a relief. We might say parenthetically that, in almost every case in which traumatic occlusion is definitely relieved, there is an immediate realization on the part of the patient that the condition of the mouth has been improved. Four days later, the pain and tenderness had largely subsided, but there remained subdued exacerbations of the tic. Two weeks later, all symptoms had disappeared.

Owing to the high character of the alveolar structures, the high resistance to infection and the adequate care that the patient gave her mouth, certain symptoms that would ordinarily have localized around the tooth were referred as a reflex to the nerve trunk supplying this region.

It frequently happens that the periodontist is consulted by a patient who does not know whether or not he needs periodontic treatment. Either he believes he has a cavity that the dentist has been unable to locate or he notices deviations from the normal in the gingival structures that have not been commented on by his dentist. The sensation of a cavity either with or without sensitiveness of the tooth surface is one which is quite often produced as a result of occlusal trauma. It is difficult to say in

some cases why the patient describes this condition as a cavity, since it commonly occurs without pain. It is probable that the age-old dread of cavities, which were the first recognized signs of dental disease, leads him to believe that any discomfort in the mouth proceeds from a cavity. In the absence of definite signs of caries, we are safe in searching for traumatic occlusion. In these cases, this condition will usually be found to be brought about by the wedging of a high cusp between two opposing teeth. Shortening and rounding this cusp will usually give relief, provided the approximal contact has not been lost. In those cases in which some evidence of gingival disease is discernible to the patient, the diagnosis of traumatic occlusion may still be somewhat obscure. We see many cases of ulatrophia without evidence of inflammation in which we can eliminate the toothbrush as a causative factor. These cases frequently exhibit extreme sensitiveness of the exposed root-surface. They frequently present cervical caries. This combination of symptoms is quite characteristic of cases of traumatic occlusion. Frequently, the sensitiveness may be diminished to a marked degree, simply by improvement of the occlusion.

The search for cavities and the disregard of early gingival lesions on the part of the dentist is at this time characteristic. This attitude is probably an inheritance from our preceptors, whose knowledge of gingival disease was so limited. But it does appear that, even at the present day, patients worry more about their "gums" than their dentists do. It is an ever-recurring happening that a patient consulting a periodontist will express the greatest indignation at the complacency of his dentist in the face of a very evident gingival disease. It is not our intention to elaborate on this point. On the other hand, apparently unimportant lesions may puzzle the dentist himself. And here an understanding of traumatic occlusion may be the key to the situation.

We have previously referred to the comparative effect of orthodontic treatment and traumatic occlusion. Our statement was that orthodontic treatment properly performed is a stimulant to the periodontal tissues. Emphasis should be laid, however, on the manner in which orthodontic force is applied. It is easily possible to move teeth too rapidly or to apply intermittent pressure, or, what may be still more serious, teeth which are being moved may be brought into a position in which they are subjected to a traumatic occlusion in addition to the pressure of the appliance. If this condition is maintained over a long period of time, the results are frequently disastrous.

A case reported to me will illustrate this point. A young woman, aged 19, in good health, had been undergoing orthodontic treatment for a number of years. At the time she consulted the periodontist, it was found that an upper molar that was used for an anchorage was elongated, was quite loose and exhibited a very conspicuous occlusal incoordination. The entire mouth showed a generalized marginal gingivitis. The upper first molar referred to had a pocket on the distobuccal root, extending nearly to the apex. The lingual root was perceptibly loose but had no deep pocket. The tissues around it, however, were swollen and congested. A diagnosis of periodontal disease due to traumatic occlusion was made, and treatment by grinding was instituted, so that the tooth was given physiologic rest. Such other treatment was given as the case demanded. Healing was rapid and the tooth became firm, although it continued to be used as an anchorage.

The occurrence of periodontal lesions showing deep pocket formation is very rare before the age of 20 years; and, when it does occur at this early age, it is always to be seen on several teeth. In this case, the affected molar was the only tooth showing pocket formation. This circumstance made it clear that, while its occlusion might not have been innocuous before orthodontic treatment was begun, the movement produced by the appliance had brought it into a position where it

was subjected to an excessive traumatic occlusion. In addition, it was noted that when the patient closed the jaw, this tooth was forced perceptibly into its socket. When the mouth was opened again, the tooth was forcibly pulled out of its socket by the pressure of the appliance. In cases of loose teeth in traumatic occlusion, the tooth, after being pressed into its socket, rebounds slowly. In this case, the affected tooth was pulled out of its socket with almost a snap.

How many times do we see a tooth previously comfortable, become extremely sensitive to cold soon after the insertion of a large gold inlay or other metal filling. This phenomenon is usually ascribed to the conductivity of the metal which has been brought so near the pulp. While this argument is sound, it is a fact that in more than one case we have found that the quickest relief to be obtained by the correction of the occlusal relation. Neither does this necessarily imply that the gold inlay was the cause of the traumatic occlusion, although cases in which this happens are very common. But, in several instances, it has been found there had been an established traumatic occlusion in the tooth, without symptoms which might have brought it to the attention of either patient or dentist. When the shock of operation and new metal was added to this previous occlusal trauma, a pulpitis of an acute form immediately developed. The condition obtaining in such a case before the insertion of the inlay was substantially as follows: The cusps of such a tooth are usually long and the sulci deep, with close interlocking with the cusps of the opposing teeth. As time goes on, this interlocking becomes more pronounced through occlusal wear. For a long period of time, however, the resistance of the tissues may be such that this condition is tolerated. There is good evidence that, even in such a case, there is a vascular disturbance that is often more pronounced in the apical region. Having added a further irritant, this disturbance becomes exacerbated. Treatment should be aimed, therefore, at the cause of the early irritation, a proceeding which has frequently given happy results in practice.

This phase of the subject naturally brings to mind a type of case that is quite common, in which the roentgenogram reveals a periapical abnormality frequently interpreted as a granuloma. More than once, dentists have opened into teeth showing this appearance in the roentgenogram, only to find the pulps vital and apparently healthy. Needless to say, a great harm would be done by removing a pulp through such a mistake in diagnosis. These lesions, for such they are, may be induced through the disturbance of the apical vascular system, induced by traumatic occlusion. This effect is frequently to be observed at the apices of teeth that have a strong alveolar support and that consequently do not exhibit bone absorption and other disturbances in the region of the alveolar crest.

The occurrence of ulatrophia, as being induced through the action of traumatic occlusion, has been commented on.[2] This condition, together with a variation characterized by the formation of clefts in the marginal gingiva, is frequently found to be caused by traumatic occlusion. That this is so is demonstrated by the disappearance of the cleft, when present, and by an improvement through reestablishing the normal parabolic curve of the gingival margin. The ulatrophia is brought about through absorption of the alveolar crest from abnormal intermittent pressure, which is followed by an atrophy of the cemental and marginal gingiva to a corresponding extent. In the presence of high resistance, infection and inflammation are kept down to a low level, and suppuration and mobility are

2. Stillman, P. R.: Early Clinical Evidence of Disease in the Gingiva and Pericementum, *J. Dent. Research*, 3:25, 1921.

therefore kept in abeyance for a long period of time. These cases must, however, be looked on as having the potentiality of asthenic inflammation and developing deep suppurative disease only in the last stages.

## Conclusion

Let us call attention once more to the fact that we are dealing with a mechanical force to which we are attributing the causation of many types and variations of disease. The instances of these variations might be multiplied still more. My purpose here is simply to refresh your memories with the fact that the collateral causative factors and the factors of resistance vary in almost infinite combinations. You are not asked to take my word for the statements which have been made, since each one of you can find such cases and can demonstrate the truth of these arguments by the correction of the occlusal trauma as found in each case. But let me urge you to approach the trial of this theory with an open mind. For there is much truth in the old Scotch adage:

> "He that complies against his will,
> Is of his own opinion still;
> Which he may adhere to, yet disown
> For reasons to himself best known."

## Discussion

*Frank M. Casto, Cleveland, Ohio:* I am wholly in accord with Dr. Stillman's present position regarding the problem of traumatic occlusion. This problem affects practically every phase of dentistry; therefore, the study lends itself to every person in the practice of dentistry, and its various specialties. Dr. Stillman and his co-workers have endeavored for several years to elicit the interest, assistance and sympathy of the profession at large in the subject of traumatic occlusion, because they recognized its real value in the prevention and treatment of oral affections, in orthodontic practice and in the partial and full restoration of lost teeth. When traumatic occlusion was recognized and understood, an important epoch was marked in the history of the practice of dentistry. The difficulty has been that men did not understand or comprehend what it was all about, and, like the introduction into dentistry of other important practices, it was grossly misunderstood, and an entirely wrong interpretation was placed on Dr. Stillman's position with regard to it. However, the time is rapidly passing when the subject can be longer ignored. Every successful practitioner will soon be compelled to give it due consideration. One of the greatest compliments to be paid Dr. Stillman and his associates for their invaluable contribution is to be found in the work that is being done in the establishment and maintenance of "balanced occlusion." Recognized traumatic occlusion and its correction is the basis upon which all of this reconstruction work is founded. Certain groups of men throughout the country have been making an exhaustive study along this line, and the clinical results have been astounding. Careful and intelligent diagnosis disclosed the fact that a large percentage of people were suffering from traumatic occlusion with its resulting sequelae. This was especially true when teeth had been lost and there existed a rather severe case of malocclusion, or when the malocclusion existed without the loss of teeth. The correction of the traumatic occlusion by the establishment of a balanced occlusion eliminated practically all of the periodontal affections and the other disagreeable and injurious conditions that follow in the wake of traumatic occlusion.

I believe that it is the thought and judgment of all those who are well informed on the subject that traumatic occlusion and its prevention and correction plays an important part in every dental operation. It, therefore, behooves all of us to give the problem careful study, intensive investigation and profound thought.

Dr. Stillman has covered the varied reaction to injury resulting from traumatic occlusion in a most comprehensive and logical fashion, and has left little more to be said. I would, however, further emphasize the point in regard to stimulation and irritation. It is perfectly obvious that stimulation ceases when irritation begins. Stimulation, as we understand it, is a temporary and physiologic process inaugurated on the part of nature for the purpose of increasing cell activity for building up, rebuilding, and protecting living tissues, but when continued beyond a certain point, becomes an irritant or the beginning of a pathologic process, which, if still continued, will become an inflammatory process with the resultant sequelae, the disfunctioning of cells, the loss of tonicity of the tissues, lowered resistance, etc. If this process goes on unabated for a long enough period, the result, as Dr. Stillman has pointed out, will be the induction of disease, the severity of which will depend on the character and extent of the pathologic process or invasion. It is, therefore, possible to have, and even more probable that we

do have, many cases coming under our observation and care that are just on the border line between a physiologic and pathologic process. These cases present a difficult problem for diagnosis, but nevertheless our responsibility is quite as great, and we should be able and qualified to render the proper service at such times.

I believe that Dr. Stillman would be happier, and he may live to see the day, should his work be the means, through education of the profession, to prevent instead of cure pathologic lesions of the periodontium.

The clinical cases cited were most interesting and conclusive proof of the results of traumatic occlusion. While they were cases somewhat out of the ordinary, I have no doubt that similar ones are quite frequently seen in the average practice. If these things be true, and I believe they are, it is the responsibility and obligation of the dentist to recognize them, make a correct diagnosis and inaugurate the proper treatment.

I was especially interested in what Dr. Stillman had to say in regard to orthodontic treatment. He has called our attention most forcibly, by the citation of a case, to the damage that may result from the improper application of force, or the incorrect adjustment of an orthodontic appliance. There is no doubt that great and permanent injury to the periodontium and teeth may result from the careless or unintelligent use of orthodontic appliances. The responsibility of the orthodontist becomes greater and more serious when the question of traumatic occlusion is studied, and understood.

Following is an extract from a paper which I presented at the meeting of the Association last year.

"Traumatic occlusion is most frequently the result of malocclusion, or of an abnormal contact of the occlusal inclined planes of the teeth. Injury to the periodontium usually does not occur until after the malrelation has existed for a considerable time. It may, however, occur in cases of short duration. This is more particularly true in cases under orthodontic treatment, especially where such treatment has placed one or more of the teeth in too prominent an occlusal position, which causes them to receive too much occlusal stress, for example, in those cases in which the orthodontist is desirous of changing the occlusal plane by elevating some of the teeth in their sockets, a procedure which in time causes them to receive the full force of mastication or occlusal stress, or where molar teeth used for anchorage are elevated and tilted distally or mesially together with some rotation, or where a tooth is moved rapidly into a new position and is not protected by the support of the adjacent teeth. In these cases, if the teeth are permitted to remain in such positions very long, the periodontium is very likely to be damaged.

"The orthodontist and the periodontist should collaborate in the study of many abnormal mouth conditions coming under their observation. If the orthodontist had a better comprehension of the scope or field of work of the periodontist, and the periodontist had a better understanding of the work of the orthodontist, the knowledge gained thereby would result in greater advancement in both fields of endeavor."

I would urge that every dentist give the work which Dr. Stillman has begun, serious and conscientious consideration, that he may thereby render a better and more efficient service.

*Olin Kirkland, Montgomery, Ala.:* There are unquestionably a variety of reactions resulting from the effect of occlusal trauma. In most instances in which a patient has an obscure pain or discomfort in the dental organism and no caries or nonvital teeth in the area involved, it is good practice to assume that there is some occlusal disturbance, and occlusal relationship should be given first consideration. In most cases, the correction of the traumatic stress, giving the teeth physiologic rest, will result in prompt relief.

As Dr. Stillman stated in the beginning of his paper, the injurious agents responsible for periodontal disease are of three principal types: mechanical, chemical and bacterial.

Traumatic occlusion in itself, uninfluenced by other agencies, could not be responsible for the deep seated periodontal lesion, but the long continued irritation influenced by it, through interference with the circulatory system, in the structures involved, has a tendency to lower the tone, and prepares the way for the invasion of micro-organisms in these tissues, which have been deprived of their resistance.

The progress of disease in the periodontal structure is limited by the resistance of the tissues acted on. The individual who possesses resistance to the onslaught of periodontal disease is usually one with well developed teeth and bone structure and good occlusal relationship. No doubt, general health and mode of living, with special reference to diet, has a marked effect on the resistance to the attack of disease.

The extraction of the third upper molars has a remarkable influence on the occlusal relationship of the remaining teeth in both jaws. In my own mouth, the upper right third molar was removed about fifteen years ago, and the upper left third molar eight years later; and the lower third molars have elongated, owing to the lack of occlusal function. In the effort to use the anterior teeth in masticating, I

find that the distal cusps of the upper second molars come in contact with the mesial cusps of the elongated lower third molars, causing a complete change in my occlusal relationship, which has been responsible for a rapid wearing away of the cusps of all teeth both anterior and posterior, producing a very unpleasant sensitiveness, with a degree of ulatrophia at the gingival margins. Since discovering this pathologic condition in my own mouth, I have given marked attention to similar cases in my practice, and have been rewarded by the discovery of several patients with parallel conditions.

I do not think that in deep-seated periodontal lesions, in which a considerable portion of the investing tissues is involved, and in which there is more or less necrotic cementum with some necrosis of the alveolar bone, merely correcting the occlusal disharmony will result in a cure, although there will be in all cases a marked improvement in the stability of the teeth involved; and much comfort is generally experienced by the patient as a result of correction of the occlusal stress. In such cases, I have experienced most pleasing results by thorough curetment of the denuded cementum and the necrotic bone around these teeth after having first corrected the traumatic occlusion.

In a young woman, aged 33, whom I treated two years ago, the upper central incisors were quite loose, and the left was slightly susceptible to a rotary movement, showing practically no attachment except the apex and the labial portion of root. There was a slight protrusion of upper anterior teeth, and the lowers had worn deep grooves in the lingual surfaces of the upper centrals. The occlusal stress was terrific, with an excessive degree of mobility when the excursive movements of the mandible were used. The teeth were very white and lustrous, and there was no deposit, either salivary or serumal, only denuded cementum and necrosis of the alveolar bone. The first procedure in treatment was correction of the traumatic occlusion, giving the teeth complete physiologic rest, followed by thorough curetment of the root surfaces and the surrounding necrotic bone. The results are good, judged by a roentgenogram and the teeth are tight and comfortable. I see no reason why they should not give many years of service; and the aesthetic appearance is much better and more pleasing to the patient than the most scientifically constructed bridge. There were no other teeth in this patient's mouth that were at all seriously involved, not even the lower incisors, which were responsible for the traumatic stress on the ones involved. I feel quite sure that these lesions found their incipient etiology in injurious occlusion, but do not think that the result obtained could have been possible without the curetment.

*Frederick A. Bricker, Rochester, Minn.:* I want to emphasize the importance of care in making a diagnosis in these cases of traumatic occlusion. I might refer to one case coming under my observation. The patient could not talk English, so he had an interpreter. He presented a perfect mouth with the exception of two laterals which showed a great loss of alveolar support. I tried to get the case history, and I was satisfied that there was abnormal wear on these laterals. Surface wear could be detected, but it was impossible for the patient to place his jaws in such a position as to produce occlusion on these teeth. I took impressions and made models, which I mounted on a Munson instrument. I was enabled to so place the jaws showing the position and to reproduce the same position in the mouth and I then relieved them by grinding. The next morning, the patient was at the office early, with the interpreter, who said "You have ruined the General's teeth. Last night he was going to write, and when he closed his teeth, he could not think." He would hold his pencil between his teeth, presently changing it to the opposite side of his mouth, and bringing stress on these individual teeth. After the condition was explained and the stress removed, the case cleared up very nicely.

*George R. Warner, Denver, Colo.:* I want to speak of the matter of cervical sensitiveness. I think in the past there has been no one thing more embarrassing to periodontists and dentists engaged in children's practice than cervical sensitiveness. This condition has not been treated with any satisfaction to the patient, at least, and it is interesting to know that in quite a large percentage of cases of gingival infection, the cause is traumatic occlusion, and that the relief of the traumatic occlusion will automatically clear up the cervical sensitiveness. I have in mind the case of a young woman who is an assistant in a dental office. She had been treated thoroughly for periodontoclasia, and she gave her mouth the best of care. Her teeth became so sensitive eventually that she could not bear to have the follow-up treatment for the periodontoclasia. She came to me for a diagnosis in relation to traumatism, suspecting it existed, but not being sure. Examination showed that the margin of the gingivae was irritated in certain areas and that there were deposits under the marginal gingivae. I told her it might be necessary to have a "nerve block" or resort to general anesthesia to have the deposit removed. But we relieved the traumatic condition, and

three months later, in testing the teeth, we discovered that the sensitiveness had entirely disappeared.

*B. Frank Gray, San Francisco, Calif.:* I feel the periodontist is offering to the orthodontist opportunities that may aid us very much in our work. Members of your specialty have called to my attention the possibilities of remedying conditions of traumatic stress in some of the patients in my care. All orthodontists are familiar with the conditions caused by a lack of vertical development in the bicuspid or molar region. In cases of this type, in adults the judicious grinding and polishing of the mandibular incisors and cuspids will prove a great help. In young children in whom the condition is so frequently met with, there are orthodontic methods of bringing about the proper vertical development of the buccal teeth. While these methods are more or less well known to orthodontists, I fear there is still much neglect of this tremendously important phase of our work.

Some of my periodontist friends have urged the possibility of aiding in the treatment of the average case of malocclusion through grinding and polishing certain teeth that presented an obstacle to physiologic occlusion. I have always replied that while I believed this might be true in well selected cases, it must be remembered that in young children the orthodontic operation is of paramount importance and the question would arise as to when this grinding and polishing should be done. Certainly not until the orthodontic correction has been made, and still further, not until proper opportunity has been given the individual teeth to find their approximate resting places after a reasonable period of retention. If these considerations are overlooked, we may base the work of grinding on a false premise.

The longer I practice orthodontia, the more am I convinced of the possibility of making relatively satisfactory corrections of adult cases. Since the largest problem involved is that of retention, I feel that, with the availability of removable retaining plates of the McBride-Hawley type, we can maintain the teeth in their new relations indefinitely. In treating these cases in adults, the periodontist's cooperation is most valuable.

*G. E. Bishop, Cleveland, Ohio:* Perhaps you know of Dr. A. D. Black's operation and of how he incises the gums and establishes a new alveolar line. He stated that he could do this anywhere in the mouth except on the six anterior teeth above, and he gave as the reason why he could not do it there that one cannot cut away enough of the periosteum to make an even gum line in that position in the mouth as one would cut away all of the structures. It may be done on the lowers, the upper molars and the lower molars and bicuspids, but not on the upper incisors. After the clinic, I asked Dr. Black what he would do if he had six anterior teeth standing apart, a thirty-second of an inch. He said he would extract them. I did not have the opportunity to discuss the matter with him, but it so happened that I had had a patient who presented herself for examination and wanted her mouth gone over. She had distal pockets of the four upper incisor teeth, running nearly to the end of the roots. Although the teeth were standing one thirty-second of an inch apart, they were not loose. There was healthy bone mesially and labially. She thought that the teeth always had been separated. Since I could not see that occlusion was causing the separation—no evidence of malocclusion or traumatic occlusion—I decided that these pockets were sufficiently bad, and the deposits of serumal tartar were probably sufficient to have caused the teeth to move apart. I expressed the opinion that it might have taken twenty years for them to separate, through the slow destruction of the alveolar process, to get to the point where they were separated a thirty-second of an inch. I said that if the separation was due to these pockets, then after curetting those roots and getting rid of the tartar, creating a healthier process, etc., these teeth would go back of their own volition. The patient returned in three months, and the teeth had come together and were as even as teeth should be.

The only limit to a perfect result in these cases is the ability to remove the mechanical irritations that are due to the deposits of serumal tartar. Traumatism is blamed too much for traveling teeth. Many have seen teeth that have traveled and when the mechanical irritation was removed, the teeth have returned to normal without further attention.

I should like to ask one question: In the case of the man who had an hypertrophied alveolar process around the gingival edge of all his upper teeth, what was the cause? Also what is the cause of sensitiveness a week or more after amalgam fillings are placed, when there is no sign of traumatic occlusion?

*Dr. Stillman:* I do not know. Last week, a man, aged 21, who had had a small amalgam filling placed two weeks previously, came in. A roentgen-ray examination revealed no encroachment on the nerve. There was no occlusion with the upper teeth. Percussion showed no signs of soreness and no evidence of local irritation about the tooth. The tongue was coated, and I gave the patient some sodium bicarbonate. He left for a lake trip the next day, and when I saw him recently he told me he did not have another attack of

the toothache after he had taken the sodium bicarbonate. Sensitiveness of gingival margins and sensitiveness which follows the insertion of fillings are caused by some irregularity along the line of the alimentary canal.

Dr. Bricker brought up the topic of subconscious habits of occlusion. Whether these habits are subconscious or unconscious ones is a problem for a psychologist to determine. Certain it is that the use of teeth both during sleep and during waking hours is mostly accomplished with absence of the will. They are therefore involuntary habits, and it was an involuntary habit in the case of the Mexican general whom Dr. Bricker treated. It was discovered that this patient had formed a habit of placing the mandible in some position of eccentric occlusion and was causing injury to the investing structures of these teeth through intermittent pressure. This is an observation of frequent occurrence in my practice. The curious thing is that the patient is usually quite unaware that he has this habit and will usually emphatically deny that he ever places the mandible in so absurd a position.

I should like to have Dr. Warner make it clear whether he meant by "gingival sensitiveness," sensitiveness of the gingival tissue, or whether he meant sensitiveness of the cervical areas on the teeth. I seldom encounter extreme sensitiveness of the gingiva except in acute infections, such as phagedenic gingivitis. When Dr. Warner was speaking, I took it that he meant the sensitive areas on the tooth near the gingiva.

*Dr. Warner:* I meant the surfaces of the tooth.

*Dr. Stillman (closing):* I should like to tell Dr. Gray that when I was preparing this paper, I had back in my mind the hope that some orthodontist would say something in his discussion regarding the treatment of adult cases in their practice, and about the treatment for the relief of traumatic occlusion in particular. Orthodontists, as a rule—at least those with whom I have been associated in the treatment of cases—do not relish the cases in adults, particularly, if the patients have established periodontal disease. They shy at this type of case. Dr. Gray must have the courage of his convictions. I frequently refer cases to orthodontists. Several times, I have had cases of traumatic occlusion treated by orthodontia, and the results were very successful. Even in such cases, however, there has been need for grinding to about the same extent that natural compensating wear would have occurred had the teeth had the advantages of correct function.

If orthodontists as a class would treat this type of adult case, far better results would be obtained. The adult reacts to the irritation caused by an appliance more acutely than does a child, and the case requires slighter tension. There is also greater liability of inflammation. However, it is entirely feasible to treat an adult by modern orthodontic methods.

Dr. Bishop inquired as to the cause of cervical hypersensitiveness. He asked if it were due to a "thickened" alveolar process or to a "thickened" marginal gingiva. I must assume the part of discretion and say that I do not know. I have many cases of this type and a large measure of success, but one could not make a diagnosis from a hypothetical record of a case. If such a case showed some measure of traumatic occlusion—and those cases showing a thickened marginal gingiva typical of hypertrophic ulatrophia do present traumatic occlusion—I would correct the occlusal relation by grinding. If there was need of curettage, I would curet. And, above all, I would teach the patient how to keep this area clean and the gingival vessels stimulated by the use of a toothbrush. The sensitiveness near the cervical margin is usually the result of incipient caries of the cementum, which results from adherent debris high in bacterial infection together with irritation coincident with traumatic occlusion. Such an area needs stimulation and cleanliness. When stimulation is inaugurated and irritation is suppressed, there results a building of tissue. Irritation ends in retrograde processes, while stimulation results in the building up of the structure.

# PLASTIC, FACIAL AND MAXILLARY SURGERY

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THE extension of the horizon of plastic surgical possibilities during recent years has brought to light an infinite number of opportunities for surgical assistance of this character which in former medical, dental and surgical practice would have passed unnoticed.

In natural sequence it has thus become necessary for the general practitioner as well as the specialist to have at least a good working knowledge of the kind of cases that should be recommended for plastic surgical treatment, and those that should not be so treated. Even though he may never undertake operations of this character, the physician or dentist must needs be prepared to decide for his patients, from time to time, as to the advisability or the inadvisability of attempting the correction of such cosmetic and other defects as may come to his attention in the course of daily practice.

Much of our modern plastic surgery is really of very remote origin. The Italian method of constructing a nose from a flap with pedicle attached to the arm was illustrated by Tagliacozzi in 1597. The Indian method of carrying down a flap from the forehead, as described by Keegan and Smith in 1860, is of even greater antiquity, and so it is more or less with many of the classic operations that are carefully illustrated in modern works on plastic surgery.

Notwithstanding the ancient lineage of this work and the somewhat prevalent opinion that comparatively few actually new operations were developed in the war surgery, the opportunity to do large numbers of unusual plastic operations and to study their results in so many cases so changed the methods of procedure in application to even old operations that, in effect, they became practically new, and in many instances might well have been considered original. With broadened vision the surgeon now recognized the possibility of correcting deformed or unsightly features that previously would have passed unnoticed, while the discovery through wider experience that many more or less spectacular operative undertakings are really very simple and with ordinary skill and care almost uniformly successful has made a corresponding decrease in hesitation to recommend or apply them. In this situation, judgment in the selection of types of operation becomes all important. It is with this thought in mind that some suggestive rules are herein laid down as pertinent. The accompanying illustrations present more clearly the reasons for these plastic operative precepts and the results of their application.

After the character of the tissue to be treated and its availability for the intended purpose have been determined, the two most active governing influences as affecting the future cosmetic result will be muscular activity and scar tissue contraction, both of which are so closely interwoven in their effect as to be almost inseparable in description. Muscular activity must either be steadily against improvement of the unsightliness of the affected part, or it may be counted on to enhance postoperative good appearance in accordance with the character of the provision for these future changes

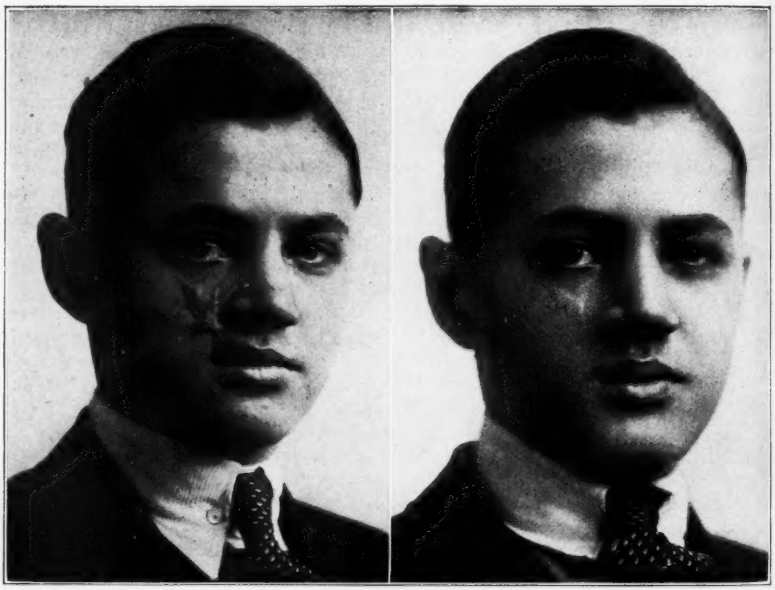
that may have been taken into account at the time of operation.

Obviously, the skin surfaces must correspond to the surrounding skin as nearly as may be practicable. The dead white of a transplant set in a surrounding of more natural ruddier skin is sometimes almost as unpleasant as the original defect. Hair or its absence, as a matter of course, is an important factor in the selection for the required purpose. Bone can safely be grafted to raw bone surfaces, but if used as an implant, it will soon disappear.

Cartilage may be implanted almost anywhere and will prove permanently dependable if properly placed, fat transplants do well under favorable circumstances, and fascia may be made to serve many useful purposes.

Dermal, whole skin Wolff grafts, the epidermal Thiersch grafts, Esser's inlays[1], and Gillies'[2] outlay modification of Esser's method all have their selective preferences in suitability for different situations and conditions.

Whenever there is likelihood of future operative steps that include the grafted surface, the dermal graft seems to give a more dependable foundation than the epidermal. Any raw tissue surface that will permit the placement of a large epidermal graft covering the whole area perfectly and laid under a modeling compound mold, as described by Esser, may not only be counted on with reasonable certainty to give a 100 per cent result, but will also have a more natural appear-



*A* *B*

**Fig. 1.**—*A*, appearance of patient, showing deforming facial scar; *B*, appearance after removal of scar by operation.

1. Esser, J. T.: Studies in Plastic Surgery of the Face. Ann. Surg. 65:297, 1917.
2. Gillies, H. D.: Plastic Surgery of the Face, p. 272.

ing, less scarred surface than usually follows the grafting of small pieces of skin, many of which are floated off by the accumulation of serum under the graft so that the covering is finally secured by the extension of islands of skin here and there.

It must always be remembered that in children or young persons scar tissue will not keep pace with the growth of surrounding normal structures, so that as years go on even the most perfect cosmetic effects may thus become less sightly and more unnatural in appearance. Scar contraction will also steadily shrink or tend to contract the part. An immediate shrinking at the time of operation is always allowed for, although this is sometimes overdone. With careful preoperative measurement and accurate judgment, it will seldom be necessary to make the actual oversize of flap and soft tissue graft surfaces one-third larger than the surface to be covered, as is frequently recommended. It is, however, the gradual, but often long continued, tightening of scar bands that bids one look ahead and try to make them counterbalance each other in so far as may be possible in order to avoid distortion as time goes on.

### Differences in the Characteristics of Scar Tissue

There is much yet to be learned about scar tissue as affecting plastic surgical results that ought to be understood and advantageously applied. Scars sometimes differ widely in their reaction to operative procedures. For example, scar tissue at times will break down under operative conditions very treacherously and, if depended on, will often cause failure, whereas at other times it may provide a much needed resistance and really be the mainstay of a plastic. A deforming facial scar such as is shown in Figure 1A may safely be excised and muscular alinement restored thereby with much improvement and without fear of recurrence of the defect if the parts are properly adjusted. On the other hand, a keloid like Figure 2, because of its tendency to proliferate, should not be touched with a knife but should be controlled by the application of radium, the roentgen ray or similar treatment. In this connection, it should be kept in mind that scars that do not distort the features or limit muscular action in such degree as to give rise to an unpleasant or otherwise noticeable change of expression do not, as a rule, cause serious disfigurement.

Fig. 2.—Keloidal scar, which was softened and improved to some extent by treatment with radium (by Dr. O. H. Foerster, Milwaukee).

### Postoperative Scars

Regarding the possibilities of attempts to prevent noticeable postoperative scars, it seems safe to conclude, after wide observation, that invisible scars on the skin surfaces that have been deeply cut exist only in the minds of well-meaning authors, on the pages of their writings and in the alluring word pictures of

discussions of the subject. It is imperative, therefore, to plan the details of an operation so that the line of incision may be made to blend with natural features in order that the scar line may be hidden as much as possible. Also, every care should be taken to assure perfect skin border approximation, and by the use of the finest of needles and suture materials to avoid to the utmost limit every tendency to scar formation; this should be supplemented by careful after-treatment often over a considerable period of time to prevent stretching of the scar by skin contraction. In my own work, horsehair sutures are supplemented by 1,500-fine vaselined linen placed with the very finest needle that is made, and the skin borders adjusted under a magnifying glass.

### Deeply Depressed Scars

A continuous line of scar should be avoided whenever it is practicable to do so. Rows of buried sutures including the deeper as well as the superficial structures must be so arranged as to reduce to a minimum the likelihood of a continuous line of scar which by cicatricial contraction might cause a recurrence of the disfiguring depression.

### Correct Muscular Alinement

No effort is too great if natural muscular alinement may be secured thereby. This is particularly true in dealing with children. Step operations, even though there may be considerable periods between them, are far better, if natural growth can be depended on to make possible more perfect association of related parts in the course of time, than a more effective immediate operation involving destruction or radical displacement of muscle tissue. Figure 3 illustrates the truth of these conclusions.

*A* *B*

Fig. 3.—*A*, infant with harelip and cleft palate, showing marked deformity; *b*, appearance of child a few years after both lip and palate fissures have been closed by step-operations. The photographs illustrate the symmetrical effect of properly alined muscular action and normal respiratory function restored in the course of natural growth because no operative injury was done to either the erupting teeth or the developing bone structure when the fissures were closed.

## Burns

From an operative point of view, burn disfigurements are both encouraging and discouraging. I have shown examples of what Nature can do in the way of skin reproduction after extensive burn destruction, and also of the correction of ectropion of the lower eyelids and destruction of the lower lip from burn scar contraction. Correction was accomplished by skin grafting of the eyelids and plastic surgical operative readjustment of the parts to correct the shape of the lip and permit the mouth to close, chiefly, as far as this patient was concerned, so that a cigarette might be held between the lips.

Other slides presented show other burn deformities and emphasize the advantage of the step operative treatment of such cases in order to ensure cosmetic improvement. There are, as everyone knows, several types of operation for ectropion of the eyelids. Pedicled flaps from adjacent parts may sometimes be available, dermal grafts may be employed to restore the eyelid, or epidermal grafts may be preferable, when applied directly or laid over a modeling compound, according to Esser's method, with skin borders sutured over, which are to be released several days later and the lid stretched under tension, in order to overcome contraction. Occasionally, a simple plastic readjustment may be sufficient without skin grafting. Each of these has its place, but the selection of the best plan of procedure is frequently a difficult and always a most important matter.

Since it is the postoperative scar contraction that has a tendency to reproduce the ectropion, this must be looked on as the chief adverse factor to be guarded against in determining the character of the operation that may promise the best results. If a pedicled flap can be secured without any noticeably disfiguring scar, and its formation such that future contractions will be in a favorable, rather than an unfavorable, direction in relation to the future movement of the eyelid, then it may be considered as desirable. This principle should be the deciding factor in making selection from among the several different operations that various authors have recommended and illustrated for similar cases.

Usually, a skin graft is quite sufficient if the lid be drawn up and held by temporary sutures in full extension over the upper lid until the grafted surface has become adherent. If additional corrections are likely to be required, a Wolff graft will probably give a firmer foundation for future operative conditions, and would therefore be deemed preferable. Otherwise, a Thiersch graft may be advantageously applied with an outlay or an inlay of modeling composition, as described, with perfect impression of the raw surface secured by the softened compound, and therefore capable of giving complete contact of the graft at all points of the raw surface upon which it is laid under the skin, without the collection of serum to prevent union.

Very extensive ectropion, as in slides here shown, seems to require the inlay method for its first large surface correction. In this case, for the first step operation, Gillies' plan was followed as nearly as conditions permitted. The tissue was widely freed by a curved incision below the deformed tarsal cartilage and large epidermal grafts from the inner side of the arm were sutured (raw side out) over a modeling compound molded to fit the wound surface. This was placed, and the skin borders of the incision were sutured together, with the parts drawn over the modeling compound. Two weeks later, the line of the original incision was opened and the modeling compound removed, leaving the adherent and growing skin graft in place. The lid was then drawn up over the upper eyelid and held in this position by ligatures passed through the tarsal cartilage of the lower lid and fixed in extension by attachment to adhesive on

the forehead in order to prevent retraction. The result of the first step gave an improvement of approximately two-thirds of that required for full correction and reduced the ectropion down to dimensions which can now be corrected by a more simple additional skin graft.

### Eye Socket Restorations

The introduction of skin to line the orbit for the purpose of inserting an artificial eye is often very disappointing. Even when the entire surface of the graft is successfully united, the shape of the orbital cavity is likely to be such that an artificial eye cannot be retained. In the case illustrated in Figure 4, the lids were dissected free, and an impression of the orbit taken under the extended flaps. A large glass eye was then increased in size by the addition of modeling compound in such manner as to retain its original form, although much enlarged. Over this, epidermal grafts were sutured, with raw surfaces out. The skin covered glass eye was then put in place and the upper and lower lids sutured over it. Fourteen days later, the lids were opened and the modeling compound removed, leaving a perfect epithelial lining in the orbit. When the compound was removed from the glass eye, the eye was put in place and was retained perfectly. In the course of a very short time, contraction made it necessary to use a smaller eye, but this had been anticipated and provided for. Later on, it is expected to put eyelashes on the restored upper lid and make further corrections if needed.

*A* *B*

Fig. 4.—*A*, appearance of patient whose eye had been burned out two years previously in the course of treatment for a suspected malignant growth which was later reported by her surgeons as microscopically benign. After a two years' interval without recurrence, it was deemed safe to operate. The lids were dissected free and lined with epithelium by suture of an epidermal skin graft, raw side out, over a Stent, as described in the text. *B*, appearance after operation with glass eye in place. Spectacles are worn to hide a depression due to external bone destruction, which, later on, can be improved with a rib cartilage implant.

### Nasal Outline Defects

The improvement of nasal outline defects is usually very satisfactory. In the case of a saddle nose, as shown in Figure 5A, the placement of a rib cartilage implant through an intranasal incision is usually dependable in its immediate result, and gives a gratifying change in the appearance of the patient. By this method, as advocated by Cohn of Baltimore, but with a cartilage (not bone and cartilage, as he recommends), there is no external scar. The reduction of a hump nose by the introduction of the necessary instruments for the removal of the excessive portions of the nasal bones is also easily accomplished through the same kind of intranasal incisions, as shown in Figure 5.

*A* *B*

Fig. 5.—*A*, saddle-nose, nasal bones fractured and depressed through accidental injury in childhood; *B*, appearance of patient after the placement of a rib cartilage implant above the nasal bones through an intranasal opening, without causing any external scar.

The formation of a nose according to Gillies' modification of the Indian method is illustrated in Figure 6.

Many operative steps were required for the nasal and facial restoration of the boy whose nose and the central portion of the upper lip had been lost in infancy. Direct approximation of the lip fissure borders was accomplished by wide undermining dissection to free the facial muscles and permit their being drawn forward sufficiently. A rib cartilage implant was then placed above the remaining fragments of the nasal bones and two small pieces of the same cartilage were implanted under the skin of the abdomen for future use. Later the implanted cartilage and skin covering the nose was freed and turned down to form the epithelial lining and to supply a cartilaginous tip for the new nose. At the same time, tissue cut to pattern from the forehead was turned down and laid over the raw surface of the previously inverted nasal flap and fixed in position with sutures. The raw surface on the forehead was made quite narrow by an incision well back in the scalp, from which the scalp was slid forward, thus lowering the hair line but without noticeable disadvantage, and the final covering of skin was secured without grafting by adhesive straps according to Beck's method. The resulting scar defect is very slight and it is believed to be much less than would have resulted from a grafted skin surface. A wide pedicle was left attached to aid in the support of the later operations, and finally severed after a considerable period of time. The cartilage pieces were then taken from the abdomen and placed just below and outside the situation of the alar cartilages. After they were fully united, they were turned up to reproduce alae as much as might be, and the surfaces thus laid bare were closed by suturing the surrounding tissue to cover the defects.

Operations to reduce the redundant tissue in the lateral nasal cartilages

are sometimes required. Their results are very satisfactory, as are also a wide variety of operations to correct the size and form of one or both alae and the construction of the columna. Many of these corrections are required in the reoperation for harelip defects resulting from their early maltreatment.

cartilage between the raw surfaces of the folded flap and covering the exposed surface from which the flap was raised by a flap carried up from the neck is that, although the immediate result is sometimes very gratifying, scar contraction in the course of time has a tendency to destroy the outline to such an extent

*A* *B*

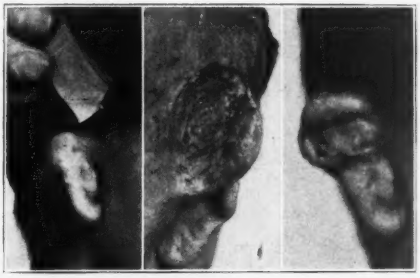
Fig. 6.—*A*, appearance of patient who had lost all of the cartilaginous part of the nose, including the septum and a portion of the nasal bones, also the anterior part of the mouth and central part of the upper lip through some not very well described sloughing process which was difficult to explain since the Wassermann reaction was negative. The history was obscure. *B*, appearance after correction of the lip and mouth defects, and the construction of a nose as described in the text.

### Ear Plastics

Among the most difficult and, in the end, the most likely to be unsatisfactory of the operations for the restoration of lost or deformed features, the ear plastics are particularly distinguished. The objections to the plan of raising a large flap of tissue from behind the ear, folding it upon itself and placing a piece of rib

that, although a mass of tissue may remain, it soon loses the appearance of an ear and becomes a more or less formless excrescence of tissue. Figure 7 illustrates step operative procedures of a quite different method of ear formation in the modification of the Gillies' method of overcoming the antagonizing conditions that must be controlled. Rib

cartilage cut to suitable outline is implanted above and behind the ear situation. Later, a flap is raised containing the now established cartilage implant. Thiersch grafts over a modeling compound are placed and the flap sutured back into place. Later the incision is reopened and the modeling compound removed. The ear covered with skin graft is then joined to the natural portion of the ear and at later step operations the helix and the antihelix are reproduced by operative treatment. Figure 8A, presenting a deformed but partially developed ear, is important in that it calls attention to an altogether different plan for the treatment of these cases. A partly developed and deformed ear usually contains at least some of the aural cartilaginous elements, and these should be systematically extended and stimulated to increase in size and improve in form by every possible means during the developmental period, and thus the final restoration be reduced accordingly. This case is now being treated in this way to prevent, if possible, the necessity for constructing a complete ear by surgical treatment in later life. A plastic operation was performed to release the band of tissue which closely bound and held the concha. The tissue was bent forward and placed over the raw surface with complete union, which procedure now permits the steady application of adhesive strips which are tightened from time to time to give slight extension and stimulate continued growth. The appearance of this baby's ear is very similar to the one shown in Figure 7A, but it is hoped that an ear of sufficient size and good appearance will be developed by this treatment in order to prevent the necessity of constructing a complete ear by any method (Fig. 8). Figure 9 shows what can be done by surgical treatment to reduce large outstanding ears.



*A* *B* *C*

Fig. 7.—*A*, congenital ear deformity; *B*, appearance of ear after implantation of rib cartilage and skin grafting the raw surfaces after the flap had been raised with the cartilage implant included, as described in the text; *C*, appearance after reconstruction of the transposed structures to form the helix and antihelix. After scar contraction has been entirely completed, the outline can be still further improved, as indicated, from time to time.

### Atresia of the Soft Palate

Simple but effective methods of correcting pharyngeal defects of troublesome character that sometimes follow tonsillectomy or adenectomy or both are illustrated in slides shown. These cases always give great distress and the operations for their relief are often painful as well as useless, and yet this method of treatment is very simple.

### Maxillary Separation to Widen Nares

Immediate surgical maxillary separation to widen the nares is shown in

the slides presented. The increased direct stimulation of the vegetative ganglia of the nasopharynx, as affecting the vago-sympathetic balance of vital control that appears to be transmitted through the

## Orthodontic and Mechanical Restorations

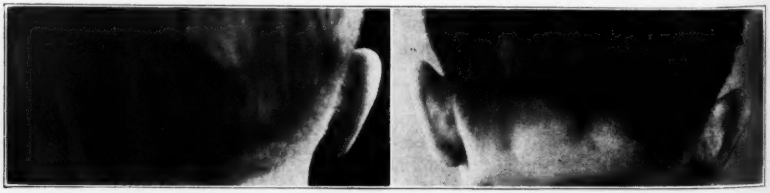
The part that dental prosthesis plays in the treatment of cases requiring restorations is one of inestimable benefit.

*A* *B*

Fig. 8.—*A*, newly born infant with deformed ear; *B*, appearance after extension treatment has been applied for a period of about seven months.

changed respiratory effect which it is believed this treatment supplies, is now fast becoming one of the safe, rational, and frequently beneficial procedures in assisting the progress of constructive benefit in many disorders of the endocrines. The far-reaching health restorative possibilities of this treatment are presented for consideration in slides shown which may serve to emphasize the very extensive field of usefulness that enlargement of the nares by immediate maxillary expansion offers in a widespread variety of cases.

When the underlying bone structures have been destroyed or are insufficient through arrested development or injury or are distorted or displaced from any cause, the value of any plastic surgical treatment of the overlying soft tissue will, in a large measure, be controlled by the degree to which the supporting framework may be restored. When bone grafts and cartilage implants are contra-



*A* *B*

Fig. 9.—*A*, appearance of patient having large defective outstanding ears; *B*, appearance after the ears had been reduced and brought closer to the head.

indicated, the prosthetic skill of the dentist must be requisitioned to construct plates, removable or fixed bridgework or by other mechanical means to supply the

necessary skeletal outlines. In many of the cases shown in the illustrations, the patients are principally indebted for their improvement to the men who gave the foundational support by many ingeniously contrived devices. Figure 10 shows a young woman in whose case prosthetic assistance was employed to supplement surgical excision of scars and correction of the form of the nose.

ment of the possibilities of this work, its intelligent general understanding by all practitioners of medicine and dentistry is fast becoming imperative.

## Discussion

*Chalmer J. Lyons, Ann Arbor, Mich.:* I should like to add one more principle to those laid down by Dr. Brown: a thorough knowledge of the behavior of tissue. Unless the operator has a thorough knowledge of the behavior of the different tissues of the body under varying conditions, these operations are going to fail.

Dr. Brown states that the skin surfaces must correspond as nearly to the surrounding skin as may be practicable. One of the most disappointing things I have observed as a result of some of the plastic surgery that was done during and after the war was in the transplanting of skin over a defect whose pigment differed from the surrounding tissues; the results were almost as disfiguring as was the scar itself. As an illustration, in transplanting the skin from the forehead to the nose, sometimes, instead of having the pigment nearly like the surrounding tissue, there was simply a white patch over the nose.

*A* *B*

Fig. 10.—*A*, appearance of patient for whom a deforming operation was performed to correct a double harelip and cleft palate when she was an infant; *B*, appearance after operation and prosthetic correction.

## Conclusions

1. The future of plastic surgery depends on the constructive activity of all practitioners in every division of practice designed to give human physical relief.

2. Many lives could and should be made happier and more useful by opening the door to better individual opportunity through the plastic surgical corrective restoration of disadvantageous facial and oral defects.

3. In the light of present develop-

Dr. Brown says, "Bone can safely be grafted to raw bone surfaces, but if used as an implant, it will soon disappear." One of the greatest disappointments in this procedure was in the attempt to transplant bone from the rib to the lower jaw. Many of these cases immediately after the operation looked good, but in following these cases along, I believe it is the opinion of the observers that a very large percentage of them were failures, because we did not have the opportunity of observing the behavior of those tissues under these conditions.

Another good point that Dr. Brown makes is that "scar tissue at times will break down under operative conditions very treacherously and, if depended on, will often cause failure, whereas at other times it may provide a much needed resistance and really be the mainstay of a plastic." We should not use scar tissue as any part of our operations. One reason is that we do not have a sufficient blood supply to the scar tissue, and if the scar tissue is to be tampered with at all, it has been my experience that all of that tissue should be removed. Frequently one will find a large scar with a definite keloid running through the center of it. We might think that if the keloid is removed, we shall not have to destroy so much of it. But it has been my observation, in such cases, that scar tissue will not have sufficient blood supply, and that, as a result, a greater scar will be left than there was in the beginning.

An operation that the general practitioner sometimes is called on to perform is that of opening an abscess on the outside of the face. In some cases this is preferable to letting the abscess rupture, thus leaving a rough, ragged scar. Whenever one is cutting in any place about the face, one must see that the line or scar which is going to result from the operation is on the same plane as the line of the face.

Dr. Brown uses, in his own work, horsehair sutures supplemented by 1,500-fine vaselined linen. I prefer the fine dermal sutures to supplement the horsehair, but this is purely a matter of choice.

*William L. Shearer, Omaha, Neb.:* Every one of these cases require study, careful survey of our patients, and very careful laboratory work before any surgery is instituted, if one expects results. No tension can be allowed on sutures, or failure is apt to follow.

Relative to the statements on atresia of the palate, it has been my experience that a large soft piece of vulcanite rubber, passed back of the palate and fastened to the teeth by ligatures encased in rubber tubes, and also a rubber tube passing down the naris to keep the ligatures from cutting, is better, and would probably be more efficient as far as the result is concerned.

*V. H. Kazanjian, Boston, Mass.:* The World War offered great opportunities for the development and advancement of this branch of surgery. Much has been gained by the writings and experiences of the past masters of prewar times, but many new problems had to be solved by the workers during the war. There are two points in particular that are not appeciated so much as they should be. 1. Wherever we have to restore parts of the nose, lips, or cheek it is absolutely necessary that we restore not only the outer surface, the skin with its underlying tissue, but also the inner surface with the mucous membrane. If this rule is not respected, we cannot succeed in securing good functional as well as good cosmetic results, the reason being that the contraction which always follows healing will cause distortion of the surrounding tissues. 2. Wherever there is a considerable amount of bony tissue destroyed, we must, for functional and cosmetic reasons, restore the bone or institute a substitute for it. We know that the soft tissues of the face are supported and maintained by the facial bones, and we also know that we cannot do efficient masticating without a hard resisting base for the masticatory apparatus. Therefore, restoration of these parts becomes very essential.

I would like to ask Dr. Brown if he has used ivory in place of living cartilage or bone for restoring nasal bridges, as practiced by certain well-known plastic surgeons of Europe; also, if, in the restoration of a missing ear of a child, it would not be better to wait until the child has reached maturity, since the reformed ear does not grow in proportion to his other features.

*S. D. Ruggles, Portsmouth, Ohio:* During the late war it was my privilege to handle a great many cases that came through the service with Dr. Kazanjian in England, and I want to press one point—the necessity for plans in plastic surgery. Regardless of the skill of the surgeon, unless the parts are maintained in a normal position and without tension, the results are likely to be a failure. Therefore, prosthesis is an important adjunct in plastic surgery.

One of the discussers said that a great many failures resulted from bone grafting during the late war, a fact that is no doubt correct. However, it was my privilege, during the war, to be on duty in the King George Hospital, London, one of the largest hospitals in England. Here bone grafting was most successfully accomplished. Mr. Cole used a non-touch technic with nearly 80 per cent of suc-

cessful results. This is especially true of the osteoperiosteal graft.

I have removed splints from these cases and have accurate knowledge of the records and the results. In regard to the periosteal grafts used in France by Lemaitre of Vichy, some were without question a success, as I had nearly a year's observation in an adjoining hospital.

*Dr. Brown (closing):* Dr. Lyons has said a number of things that were very important in emphasizing the points which I brought out, but I do not think his suggestions require discussion because, according to my belief, they are absolutely right.

I must know the condition of blood and urine as related to the general condition of the patient in every case. Before doing plastic nasal operations, I need the opinion of the best rhinologist I can get because there may be some intranasal diseased condition which would be disastrous if overlooked; and so it is with other medical and surgical divisions.

I was very glad to hear what Dr. Kazanjian said. I look on Dr. Kazanjian as one of the greatest exponents of what may be done by supplementing great classic operative procedures with most ingenious mechanical appliances. I never go over the records of his work done on the other side during the World War that I do not do it with pleasure and instruction, and I do it frequently. On his own resources on the other side, the appliances which he made with perfect constructive purpose to further and assist the plastic work that he was doing were simply wonderful. Whatever he says is a matter of importance for all of us.

Now he speaks particularly with reference to two questions, the relative merits of autogenous bone grafts and ivory. I presume he would want to add also celluloid or soup bones and all the rest of the materials that have been substituted for bone in grafting. One of my very dear friends has been a most active exponent of the soup bone, and in his work there seems to be no doubt that he does have success. Personally, I do not use them, chiefly because I have no use for them. There are quite a number of ribs and there is a good deal of rib tissue. You can take rib cartilage for an implant and put it in place and know that if you put it there properly it will stay permanently. I would not say that other structures would or would not succeed. I know that for the greater part they would not succeed in my hands because foreign bodies in tissue have a tendency to work out.

Whether the properly prepared soup bone or ivory can be used successfully or not, I would not undertake to say. Personally, because I believe in some of the men who say they have done certain things with them, I believe they can be satisfactorily applied by them but not by me, and I do not need them.

In operating on ears of children, I brought out in the paper the fact that you must always remember, as Dr. Kazanjian has said, too, that scar tissue will not keep pace with other tissues in growth. This must be anticipated; otherwise as the patients get older, the discrepancy will be noticeable. I referred to an operation on the ear of a child which I performed when the child was a few days old, not with an attempt to construct an ear, for that would be out of the question until the child was fully grown, but to prevent the need for the construction of the ear. I proposed, during the active growth period of the child, to keep slight tension which would, as far as might be practicable, tend to develop the ear. In order that this treatment might be more effective, it became necessary to make an incision along the anterior border of the ear, so that it could satisfactorily be extended by placing a Wolff graft on the denuded surface. It now can bear a certain amount of tension to extend the ear and make it grow. But never would I undertake to correct a nose or ear or any similar feature in a young child without provision for the growth of the part as time goes on, and this principle is capable of a very much wider application.

Concerning the permanence of bone grafts in the jaw, as questioned by Dr. Lyons, there can be no doubt that some of these grafts disappear as time goes on. Those that are properly done, in my judgment, do not do so, but the difference is this: if your bone graft is placed so that it is in fact an implant and not a true graft, which should be placed raw surface to raw surface, with proper adjustment whereby it is possible for bone to form there, which means strictly a bone graft, I do not believe this will disappear in such manner as to cause failure. I have reason to believe that a good many of the war patients who received grafts in this way are wearing plates today, but if that bone was placed as an implant it would only serve a temporary purpose and might be expected to disappear in time.

# FEASIBILITY OF ROOT-CANAL TREATMENT—WITH SPECIAL REFERENCE TO THE VALUE OF ANTISEPTICS IN THE ROOT-CANAL FILLING

By ARTHUR BARTON CRANE, D.D.S., Washington, D. C.

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

THE standing of dentistry as a scientific calling is enhanced more by the preservation of the natural teeth than by the construction of the most faultless artificial substitutes. So far as dentistry is unable to conserve the teeth in a state of health, it fails in the achievement of its highest ideal.

For ages, untold, savages have resorted to extraction as a means of curing dental diseases, and there are learned men in the profession today who are insistent in their teaching that modern dentistry has no other recourse.

Fortunately, no great proportion of the profession has been caught in this wave of hysteria. There are but few offices where all teeth having pulp involvement are condemned to the forceps.

The instrument department of one of the large dental manufacturing companies informs me that the sales of root-canal drills and root-canal cleansers have increased fully 50 per cent in the present year over the same period of 1922 and that sales have increased perceptibly during the past three or four years. As the instruments to which reference is made have been standardized for many years, this would seem to indicate that root-canal work is far from falling into disrepute.

While dentists in general are notoriously lax in the keeping and tabulating of case records, there is available a more or less reliable index to the status of our past efforts at root-canal treatment in any large collection of dental roentgenograms. Tabulation of any of these will disclose an absence of anatomic abnormality in the apical tissues of a surprisingly large percentage of cases. When such teeth are normal in function, disease usually exists only in the imagination of the operator who extracts them.

If root-canal operations in the past have meant the salvation of any significant proportion of the teeth treated, the procedure is not one to be officiously cast aside, but rather one that justifies the most profound study, the most extended research, the most intensive discussion, in order that the factors which react to cause failure may be understood and, if possible, eliminated.

Great emphasis has been laid on the irrefutable fact that when a tooth has lost its pulp, the dentin of such a tooth is dead. From this fact, we have the misleading term "dead tooth." A thoughtful study of the natural defensive processes exhibited in the tooth with a living pulp will carry conviction that dead dentin is not a menace to the organism. Nature does not hesitate to divitalize dentin in order to preserve the integrity of the underlying soft tissue. This process, which has been described by the

leading authorities on the histopathology of the teeth, is commonly known as the formation of secondary dentin.

The effect of the interposition of a stratum of secondary dentin between the living pulp and an external irritant is to cut off the fibrillae of the peripheral dentin, thus destroying its life. In certain cases, large areas of dentin are thus divitalized, and the process may be carried on until the entire pulp has become obliterated. In such cases, the entire structure of the dentin is dead, yet the vital cementum continues to exist in physiologic compatibility with it, and most frequently periodontal conditions appear to remain normal.

The reason for this may be more readily understood after a histologic study of the juncture of the dentin and cementum; for at the line of union, there exists a layer of homogeneous dentin in such close relation with a layer of structureless cementum that it is difficult to determine where one begins and the other ends. Thus, Nature has provided a double wall of inorganic substance, lacking in every vital attribute, which acts as an insulation between the dentin and the cementum. It is obvious that it is this inorganic sheath which limits the death of the tooth structure to the dentin and also prevents the spread of infection from pulpal sepsis except by way of the apical or accessory pulp foramina.

The rationality of root-canal work needs no more positive indication than the facts just presented. It remains for us to study more thoroughly Nature's method, in order that our technic may more closely conform to its indications.

Since the use of the roentgen ray has become so nearly universal in diagnostic procedure, many operators make its findings paramount in the discrimination of disease and health. It is generally accepted that, when the roentgenogram discloses no break in the line of the lamina dura or pericementum, a tooth with a living pulp can be pronounced healthy. In the case of teeth with pulp diseases or with evidence of a previous root-canal operation, this evidence of the health of the periapical region is often ignored, although many such teeth have apical pericementum and lamina dura that is apparently more normal than adjacent teeth with vital pulps.

The diagnostician who accepts certain factors as evidence of health in teeth of known vitality has no right to reject the same evidence when teeth are pulpless. When these teeth are condemned to extraction simply because they are pulpless, such a diagnosis is the result of specious reasoning based upon fear. An operation should not be rejected because it does not always culminate successfully; for there is no operation in the whole practice of dentistry which is universally satisfactory.

Teeth decay and pulps die under some carefully made fillings; pyorrhea and pulp involvement are not uncommon sequences of crown and bridgework, and even in edentulous cases, malignancy will sometimes develop from the irritation produced by dentures; but we justify these procedures by their successes, and since so many teeth have been saved by root-canal treatment, this procedure is justifiable upon the same basis.

It is axiomatic that a result obtained in one case can be obtained in any case in which the same conditions exist. The trouble with the application of this axiom to root-canal work is that our methods of diagnosis are so incomplete that many factors which may react to our disadvantage are not recognizable. In all probability, our inability to make differential diagnosis is responsible for more failures in root-canal work than are all errors in technic.

Why is it that in some cases in which the vital pulp is extirpated, periapical disease will rapidly supervene, while the treatment of certain other cases of extensive periapical disease will be followed by a complete regeneration of periapical anatomy? Why is it that of

two given cases apparently alike in every detail, one may succeed while the other fails, under the same treatment? Better diagnostic methods must be discovered before these questions can be answered.

The sequence of disease from pulp involvement to apical necrosis is generally understood, but there are transitional stages of the utmost significance which at present escape detection. The first disintegration of the fibers of the apical pericementum, the beginning of dissipation of lime salts from the lamina dura, the presence or absence of cementoblasts, the onset of roughening of the apical cementum, the primary break in the wall of defense in the periapical spongiosum, and rudimentary cyst formation all have important bearing on treatment and prognosis. Inability to recognize these transitional changes doubtless accounts for many untoward results.

Even when diagnosis is correct, failure will generally follow any method of treatment which inhibits or destroys the vitality of the periapical tissue cells. Chemical or traumatic injury during treatment, the projection of root-filling material or other foreign substance or premature restorations causing traumatic occlusion, with consequent apical stasis, are all factors which tend to prevent the functioning of the cementoblasts, which alone are able to render pulpless teeth innocuous.

When a correct diagnosis indicates the advisability of treatment, it is only necessary that the infective process in the dentin be controlled and held in check until the vital reparative action of the living cells in the apical tissues has time to reach completion. It is probable that mild antiseptics are as efficacious for this purpose as the most powerful. The correct use of Howe's silver reduction method, electrolytic medication with iodin compounds or even dressings of dilute beechwood creosote will so attenuate the invading organisms that the reparative process will not be inhibited, always provided that the periapical tissues are not invaded.

Even when periapical inflammation ensues, surgical drainage through the gum will often prevent complete disorganization of the natural defenses.

One of the greatest errors which has been made in the attempt to find an effcient root-canal technic is the dogma that the entire intricacies of the pulp canal must be hermetically sealed in order to render pulpless teeth safe. In the attempt to accomplish this end, the condition of many otherwise salvable teeth has been rendered hopeless. This is particularly unfortunate, as a little study makes the physical impossibility of such obliteration apparent.

Chloropercha or other radiopaque substances in a very fluid state may be made to flow into some of the intricate multiple foramina, but it is extravagant to claim that it flows into all. And even where it does flow, bulk is so reduced by solidification that obliteration is not accomplished.

A test tube filled with chloropercha and left uncorked for a short time will have only a thin lining of guttapercha remaining, and this is all that could be accomplished in any of the canaliculi.

The evil of the attempt to fill the accessory channels of the pulp canal lies in the irritation of the periapical tissues by chemicals used to deplete them, and the almost certain projection of some of the filling material.

Providentially, it is not necessary that the entire pulp tissue be replaced by filling material in order to render pulpless teeth safe. The main orifice leading to the periapical region should be sealed as tightly as possible, without risking protrusion. In this manner all that can be accomplished in the way of a physical barrier to infection will be safely achieved. The accessory canals will be amply taken care of by the addition of a slowly soluble, mild antiseptic to the filling material. Iodoform, thymol iodid, paraformaldehyd, or similar drugs, added

to the chloropercha, will serve as a prophylactic in the dentin until such time as a clean new tissue encapsulates the apex, by the natural method of repair common to all connective tissue.

That this perfect result has been attained times without number is proved by the daily presentation of teeth with partial canal fillings which, after years of test, give no clinical or roentgenographic evidence of disease. It is far better to fail to fill completely the root canal and save the tooth than it is to attempt a physical impossibility with dangerous contingency.

In extenuation of the somewhat radical statements that I have made, I wish to present the history of three cases, which, though extreme, are typical of the many successful cases upon which these conclusions are founded. The teeth in question were in such bad condition that root resection seemed to offer the only chance of salvation. With the consent of the patients, the teeth were used experimentally to test the value of the theories herein set forth.

The remarkable result attained in these cases makes it evident that the antiseptic canal filling makes complete obliteration of the canal unnecessary. It also indicates that the restoration of the periapical norm is a slow process, but one possible of attainment in certain cases.

## Report of Cases

Case 1 (Weems).—Two electrolytic treatments were given, with Churchill's tincture of iodin. A culture was negative, and the root was filled.

Case 2 (Tupper).—One electrolytic treatment with iodin was employed, and the root was filled.

Case 3 (Stahl).—Two electrolytic treatments, with drainage, were employed, and the root was filled.

## Conclusions

1. Root-canal work is on the increase, and, when successful, is more scientific than extraction.

2. Nature has indicated the feasibility of conserving dead dentin.

3. Much study must be given to diagnosis in order that prognosis may be made more trustworthy.

4. The restoration of the periapical norm is possible in certain cases of periapical disease.

5. The obliteration of the entire intricities of the pulp channels is a physical impossibility, but fortunately unnecessary.

6. The use of slowly diffusible antiseptics in conjunction with the canal filling confined to the canal will encourage the natural encapsulation of the root apex with living tissue.

## Discussion

*Edgar D. Coolidge, Chicago, Ill.:* I did not hear the beginning of Dr. Crane's paper, but I saw some of the slides. I don't know just what attitude he took on the value of antiseptics in root-canal filling in its entirety, but, judging from the latter part of the paper and the slides, I presume that the principal antiseptic that he uses in these cases of periapical disturbance is iodin, and in that I thoroughly agree. I have found iodin best for such conditions. I do not use Churchill's tincture of iodin, nor do I employ the ionization method; yet I feel that I get as good a result. The treatment of a tooth with an extensive periapical disturbance, of course, is largely an experiment, and it is not a safe thing to undertake unless it is kept under observation over a considerable period of time. If the result is as gratifying as those he has shown us in the slides, we may consider the treatment successful. Such disturbances might be classified if we could extract the tooth and examine the apical cementum, but as long as the tooth is in the jaw, it is pretty hard to make any differentiation between those that may be successfully treated or whose prognosis is good and those that are hopeless. The key of the whole situation is whether the cementum around the end of the root is involved in the destruction of tissue and has absorbed the products of suppuration. If the cementum has been denuded and the cementoblast lost, there is no hope of recovery, but in those cases in which the cementum and the cementoblast remain, the success of the treatment is assured if we can remove the infection and fill the canal properly.

The difficulty involved in root-canal work, the time involved and the expense to the patient in the experiment naturally make us a little cautious to state just how far we can go with the treatment of that kind of tooth,

and it is necessary in the diagnosis to determine the value of the tooth before undertaking such treatment. If we can answer the question whether it is possible to remove a vital pulp that is diseased without the danger of a future periapical disturbance, and if we believe it is possible, we should try to develop a method of treatment and an operative technic that will maintain a healthy periapical tissue around that tooth after treatment. The treatment of a tooth containing a vital pulp is not ended when we have filled the root canal, by any means. These cases must be checked year after year before we can know whether we have been successful or not, and it is our duty to check them ourselves, in order that we may not subject the patient to unnecessary periapical disturbances for some one else to discover.

The use of antiseptics in pulp removal is not an important feature. We do not need antiseptics. I do not believe we remove a vital pulp when there is no infection present, so I think it is necessary to consider the use of some antiseptic in every case, and that antiseptic should always be one that does not destroy the tissue about the end of the root of the tooth, even if some of it should accidentally be carried through the end of the root. A very mild antiseptic should always be used. Some of the teeth that show disturbance in the periapical tissue today had vital pulps removed from them at the time the operation was begun. I believe many of these disturbances are due to mechanical irritation or overmanipulation, overbroaching, overenthusiasm to remove all of the pulp, and overenthusiasm to fill the canal thoroughly at any cost. I believe the next important cause of these disturbances might be the use of an antiseptic that is too strong. When there are little filaments of vital pulp left after removal of the pulp with local anesthesia, pressure anesthesia or any other method, there is danger of injuring the periapical tissue. Very often in the attempt to remove this sensitive remnant, some strong antiseptic such as phenol is used as a cautery, and some escapes through the foramen. Inflammation around the periapical region is set up, which will result in an absorption of that tissue later on. I am thoroughly convinced that these two things have caused many of the periapical disturbances that we see today, as well as the infections that we have carried into the canals.

I want to emphasize the importance of aseptic technic, which I know Dr. Crane advocates just as much as anyone. We know that every detail of an operation on a pulp canal must be as aseptic as an operation in any other part of the body. But, aside from infection, some disturbances arise from overmanipulation, and mechanical injury, or injury from the use of some drug that causes the destruction of the periapical tissue.

We are to be congratulated that we have an assurance of the possibility of successful root canal treatment.

*Edward Hall, Kansas City, Mo.:* I listened to a paper of Dr. Edward H. Hatton of Chicago on "Focal Infection and Dental Diseases," and will give as distinctly applicable to this subject, a warning from Dr. Hatton on these ultrascientific methods of diagnosis for the definite determination of the localization of infections. Dr. Hatton said that a careful calculation of clinical history available to all of us will give us more definite guidance in 90 per cent of the cases than the ultrascientific laboratory tests. Not that he is discouraging these tests, because they are valuable aids a great many times. I think that will fit very well into the practical application of root-canal work Dr. Crane has presented here. I did not hear Dr. Crane's discussion on therapeutics. There are a few things in which I heartily agree with him. There are some in which I do not. First of all, I call your attention to this, that Dr. Buckley years ago gave us beautiful discourses and presentations of technic with hundreds of clinical histories and slides, where success was apparently obtained. I think it was obtained in many cases. There were many others handling root-canal work, each one using different methods or therapeutic agents, and some different methods of technic, and so on. Those of you who care to get a little closer point of view I refer to the paper I read at Los Angeles,[1] which I made the point that all of us during that period had success in spite of rather than because of the many things that we did. I am giving credit to much of our success to those vital resistance factors over which we have little control. Therefore, I would emphasize a warning against much effort that goes beyond the cementodental juncture. I believe in the aid of antiseptics, but they must be of the mildest type. Like Dr. Cooley, I believe that the greatest single thing causing failure in root-canal work is infection, and second to that is trauma caused by instrumentation or therapeutic agents. When success has been obtained the vital resistance of the patient is the greatest element. I have not used the electroiodins of Churchill; I have not used sodium-potassium for a good many years; I have not used salicylic acid. I do not have 100 per cent success. No man does. If the

1. Hall, E. M.: Résumé of Root-canal Problems and a Practical Aseptic Technic, J.A.D.A. 9:939 (Nov.) 1922.

therapeutic agent that we use is comparatively unimportant, then why incorporate the idea of medication in your root-canal filling? Only by the prevention of irritation from such sources have I succeeded in a moderate degree in root-canal preparation. A foramen should never be enlarged. In other words, we establish a point of comparative interference by definite measurement, as nearly as we can place it, at the cementodental junction, and all of our technic is controlled by measurement from that point on. One should never go three quarters of an inch into the root-canal with one instrument and five eighths with another. When preparation is complete, the canal should be large enough to admit a reasonable sized broach cone, to a sharp point, and after it is of the original measurement, one should go down until living tissue is reached. One other point, as to the magic power of an electrolytic treatment: I have an ionization outfit and have had for many years. The value of the electric current, it seems to me, in bringing about ionic medication is about as great as that of a match stuck under a locomotive for producing steam. I do not wish to ridicule it, but I wish you to test it. After all, the only effect we get in therapeutics is ionization. Churchill's solution is placed in contact with tissue and without any electric current whatever chemical ionization takes place, some of which has therapeutic value by its penetration. That is all ionization is. It is both chemical and electrolytic. I would like Dr. Johnson to carry through the application of Churchhill's solution and depend entirely on chemical ionization without the electric current, because that has eliminated some troublesome matters of technic. This is just giving you some points that are under our consideration right now. My observation has been that all attempts to employ medication in a root-canal filling tend to make it porous. That porosity means tissue failure so far as perfect sealing of the tooth is concerned. Dr. Crane showed you these three or four cases to prove the possibility of regeneration without root resection. When you resect the root end of a tooth, you expose dead cementoblast; you have removed the maximum amount of infection, and if your technic is good that tooth will be tolerated to a greater or less degree. I think it is tissue toleration. I do not believe it is scientifically correct. I would much prefer the experimental technic, as he called it, of treating that tooth, because if the cementum and the pericementum in that tooth root is dead, it should be extracted. If you do not get regeneration of the tooth, it should come out.

*C. D. Peck, Sandusky, Ohio:* In endeavoring to save teeth, roots of which were so curved that the removal of pulps was impossible, I have succeeded by applying iodoform paste and putting wet amalgam in contact with the paste; the idea being that red mercuric iodid is produced, permeating the pulps and sterilizing the root fillings. One member of this association told me he had saved teeth for thirty-seven years, and he was able to detect the odor of iodoform.

*Dr. Coolidge:* The answer, I think, is simply the wonderful toleration or the immunity of the tissue up to a certain time.

*Herman Gruher, New York City:* I believe that Dr. Crane failed to make clear the different types of root-canal treatment. We must definitely distinguish between the extirpation of a vital but diseased pulp from which no infection has penetrated periapically and the treatment of a root-canal the dead pulp of which has caused perapical degeneration or necrosis of the alveolar process.

Dr. W. Clyde Davis has advocated the excision of the major portion of a vital pulp and the retention of the apical end in situ. Dr. Grove takes issue with Dr. Davis and warns the profession against retention of any portion of the pulp within the canal.

With Dr. Davis' technic, there might be reason for the use of some mild antiseptic with some sedative quality, such as eugenol or iodoform, to be incorporated in the root-canal filling to keep the root remnant in sterile condition until it has undergone the osseous change which Dr. Davis asserts is the usual result after an aseptic operation.

With the removal of the entire pulp from the main canal of the root and the thorough cleansing mechanically and chemically of that canal, according to my deductions after twenty-five years of practice and study in this work, I can see no value in incorporating a medicament in the filling which might irritate the delicate periodontal membrane at the apical mouth of the canal. The filling of that canal to the apex or so near that roentgenographically it seems to be filled to the apex, with a bland homogeneous material, seems to me the proper procedure.

Dr. Cranes' roentgenograms have depicted cases of teeth with quite extensive bone destruction. These cases require the thorough sterilization of the dentin about the canal and also at the apex of the tooth.

In speaking of the use of antiseptics, we must clearly distinguish between their use in treatment and their incorporation in the completed filling. For sterilization of infected areas, we can employ electrolytic medication very effectively, notwithstanding the opinion

of some men that they get very satisfactory results in some cases without its use. That is no criterion as to the value of ionization of medicaments in root therapy.

The sterilization of the canal only, the periapical lesion being left to Nature to clear up, as is done by the majority of men, can be much improved on by aiding Nature by the use of electrolytic medication, with its twofold action as a sterilizing agent for the infected bone and as a stimulant to the turgid circulation of the part.

Now, as to the filling in these types of cases: If we have sterilized these infected areas or reduced the micro-organisms either in number or in virulence to such that Nature can be trusted to take care of the tissues herself, there can be no need for a medicament in the filling. A filling to be antiseptic must have something incorporated in it which can be dissipated from the filling and react with the object to be sterilized. A material that is homogeneous and cannot be destroyed by the fluids of the body, containing nothing which may either evaporate or dissolve out, leaving a porous or shrunken mass in the canal which may become the seat of future bacterial invasion and multiplication, is my idea of a proper filling in these cases.

*W. Clyde Davis, Milford, Del.:* According to the recent writings of investigators on the subject of root anatomy, from 35 to 95 per cent of the pulps of teeth end in more than one foramen. This is common, and you may find one, two, three or more in a section through one plane. As you grind down to produce the section, other canals and foramina will be obliterated. Most writers and lecturers seem to consider the accessible foramen only, and ignore the inaccessible canals and foramina.

In a series of articles in *Dental Items of Interest,* we have attempted to point out a possible means of handling these lateral canals in vital pulp cases. Some may not like the term idea or practice of "partial pulpectomy," and are still clinging to the thought that all pulp tissue may be removed. However, it is a fact well proved that the pulp cannot be entirely removed in the majority of cases.

We hear the radicals say "All right; then the forceps for pulp cases." This attitude is not in harmony with the general practice of medicine.

There are others who prefer to rely on Nature to heal the pulp wounds, thereby avoiding pulp devitalization. We have all been practicing partial pulpectomy when we have attempted to remove the vital pulp while it is anesthetized. In cases of putrescent pulp canals or when the pulp has been devitalized, we must rely on root and tissue sterilization through treatment, followed by the use of a root-canal filling which will exert a sterilizing influence on the tooth structures and surrounding periapical tissue. If this may not be done, surgery is the answer.

In the treatment of putrescence, we wish a fluid which is aqueous, and hypertonic, that the osmotic pressure may be from rather than toward the infected area. It is best that this fluid be alkaline in reaction.

The ideal root filling to meet the requirements of those who rely on the sterilizing influence of the material to maintain sterility, must possess the property of giving off a soluble germicide. It is desirable that the canal filling expand slightly on setting.

I believe with Dr. Crane that it is possible for us to rely on the root filling which exerts a sterilizing influence after being placed, excepting those cases which have denuded and therefore dead cementum in the apical region. Such cases demand a surgical operation for the removal of the root end subsequent to placing the root filling.

*H. D. Grubb, Cleveland, Ohio:* Dr. Crane has pointed out the conditions and factors that are concerned in the success or failure of root-canal operations. A discussion of this paper can only emphasize some of the important conclusions. There is abundant evidence that pulpless teeth have been retained with no resultant pathologic conditions. This fact alone should prevent any general adoption of a 100 per cent vitality policy, and as we diagnose more carefully and perfect the operating technic, the number of failures will continue to decrease. The retention with safety of a pulpless tooth is due to the defensive and reparative properties of living tissue, and the operative technic must be such that these important properties of the periapical tissues are not impaired or destroyed in any way.

Root-canal operations will be on a more definite basis, when we can operate with uniformly good results, in the comparatively healthy cases of the teeth from which we remove vital pulps before there is any serious involvement of the pericementum. Unless the degree of cell vitality is below normal, failure in such cases must be due to faults of the operating technic. Lack of asepsis; failure to limit all instrumentation and filling to the apical dentocemental junction, or anesthesia and devitalization methods may injure the periapical tissues, so that repair would be prevented.

Dr. Crane suggests the use of slowly diffusing, nonirritating antiseptics in conjunction with the canal filling confined to the canal. This addition to the filling is good technic as it would tend to maintain the proper con-

dition for repair. Complete case records, with roentgenograms taken before and after operating, will help to solve many of our problems in the management of pulpless teeth.

*Dr. Crane (closing):* I had nothing whatever to say about the extirpation of living pulps. My subject was the feasibility of root-canal treatment with special reference to the value of antiseptics in the "root-canal fillings."

I am going to try to make clear the points brought out that appeared to be in disagreement with my paper. One of the gentlemen laid great stress on the fact that the cause of our past successes was the toleration of tissue, the vital resistance, rather than anything that we had done, and I want to add to that by saying that will be the cause of all our future successes. I stated clearly in my paper that the only thing that will render a pulpless tooth innocuous is the vital function of the cementoblast or the normal repair which is common to all connective tissue. The reason for the success of so many of our past operations it seems to me, lies in two things. When I say, "past operations," I jump over a period of five or six years, back to the time before the discovery and acceptance of focal infection made us rabid in our desire to clean out every vestige of pulp tissue in every part of the pulp canal. I jump back of that, taking cases ten, twenty or thirty years old, with no roentgenographic or clinical evidence of disease. I have tried to study the reason that those cases have been so successful over such a long period, and there are just two explanations: One is either the accidental or intentional avoidance of periapical tissues in instrumentation and medication. Before we had the universal use of the roentgen ray for the purposes of diagnosis, very few of us got our instruments more than to the upper third of the root, except by accident, so that in some way we avoided traumatism to the periapical tissues. The other explanation is that in those days, before the great cry for asepsis was universal, all of us used antiseptics in our root-canal fillings. In these days, we say that we perform aseptic operations; nevertheless when we get through with our therapeutics, our dentin is saturated with antiseptics.

So far as electrolytic medication is concerned, I suppose there is no one point in therapeutics that is so universally praised on the one hand and so universally condemned on the other as electrolytic medication. This is not by any means a magical thing. About twenty-five years ago, Mr. Edison had an article in the *Journal of the American Medical Association*, entitled: "How I Cured My Rheumatism." He did it by electrolytic medication with iodin. If a man who understands electric phenomena as well as Mr. Edison understands them believes that the electric current will carry iodin to the joints of his fingers, it seems a little bit absurd for those who have only a smattering of electricity to attempt to dispute it. I will agree with the gentleman who said that Churchill's tincture, or any other iodin solution which may be used as an electrolyte is already in a state of ionization. I will agree with him that by electricity these iodins cannot be made to travel very far into the tissues beyond the teeth, but I do not believe that we ever successfully treated a case of periapical disease in which we did not produce a mild hyperemia. Electrolytic medication will produce a hyperemia which, in my hands, is more evenly regulated than any other method that I have discovered.

Dr. Gruher stated that we must sterilize this periapical area and the bone beyond the periapical area, in order to benefit those teeth. I disagree with him absolutely. I do not believe there is any method by which an infected periapical area can be sterilized, other than by the natural defense of the tissues, which provides the most powerful, the safest and the only curative antiseptic. The elimination of the feeder in a periapical infection and the action of the blood cells and of the blood plasma are the curative factors; in other words, in order to treat these cases all that is necessary is to make the dentin antiseptic and keep it so until such time as Nature shall do her own perfect work in the periapical region by the encapsulation of the end of the root with a clean living tissue.

Somebody touched on the subject of root resection. That is another "bull in the china shop." I did not mention it in my paper except to say that the teeth that I showed were in such condition that the only other recourse that I could have had in an attempt to save them was root resection.

One of the members spoke about the method of putting iodoform against a living pulp, and then putting soft amalgam against that and producing a great many good results. I think that in all probability the chemical reaction which he thinks he obtained there was largely a mental calculation. The thing that he did accomplish in liis successful cases was just what Dr. Davis is advocating. He accomplished partial pulpectomy. He did not cause any pressure and consequently his teeth gave no after-trouble.

# FOCAL INFECTION

By EDWARD H. HATTON, B.L., M.D., Chicago, Illinois

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

IN spite of the thorough and voluminous manner in which the subject of focal infection from the dental point of view has been treated in the past, there are phases of the subject that deserve further consideration, especially those that concern the anatomic background and the tissue changes associated with it in the jaw structures, as well as the application of laboratory methods employed or suggested for its diagnosis. This discussion is to be confined largely to these topics.

There is a disposition at this time, if not to question the whole principle of focal infection, at least to limit its application. There has always been a tendency in this direction, and such a critical attitude has its place even among those who favor this notion, but it would seem that now this attitude has extended beyond this point, and that there are being carried into practice conservative ideas that in the past have had disastrous consequences. In other words, in the effort to find a safe middle ground between either extreme, conservatism seems, perhaps, to have a little the better of the argument. On the other hand, evidence collected from the clinical and bacteriologic points of view by Billings and his associates, and Rosenow and a host of others favoring the theory is almost bewilderingly abundant. It is this state of affairs that has prompted me to make this choice of the present method of presentation.

The studies of Cryer[1] of the variations of the bones of the jaws in health and disease furnish a foundation that is indispensable to the studious dentist or physician interested in the progress of mouth infections, since the changes of bone in disease are principally made up either of an increase in bone density as the result of increased calcification, or of a decrease because of the predominance of the phase of absorption. These conditions seem to bear a very important relationship to the spread of infection, because, where bone density is increased around a region of low-grade infection, its spread into contiguous structures is limited to a minimum, and distribution can, therefore, be effected only through the blood stream and lymph channels. This conclusion is arrived at not only from the evidence offered by the bacteriologists and clinicians but also because it is easy to demonstrate in examples of the latter type of infection numerous vessels surrounded by zones of perivascular infiltration presumably in and around the lymph spaces. It is immaterial whether the bacteria find entrance into the lymph channels and therefore ultimately into the blood stream, or whether they penetrate directly the vessel walls adjacent to which they lie. This type of lesion seems potentially to be a greater menace because the tendency to expansion is resisted by the dense,

1. Cryer: Internal Anatomy of the Face.

bony wall surrounding it, and the products of the inflammatory process are almost forced into the circulation. These lesions are necessarily small, often microscopic, and because of the dense, bony wall surrounding them, they do not produce records of any kind in the radiograph, or if they do, the records are interpreted with difficulty. It is undoubtedly unfortunate that radiographs of this type of periapical infection are at all uncertain, because of what seems to be the innate viciousness of this kind of infection.

Fig. 1.—Apex of a tooth with a periapical infection: *A*, main canal; *B*, accessory canal; *E*, nest of leukocytes; *H*, layer of cementum on pulp wall; arrows point to regions of absorption. Bacteria are recovered, if at all, from regions close to the apex, as at *E*. Absorption occurs only in the presence of living cells (see arrows). It is evidently incorrect to say that such roots are bathed in pus. Chronic periapical infections of this type are frequently encapsulated and small, and may not produce shadows in radiograms.

Calcification bears a certain relationship to the degree of irritation produced by the infectious process, at least in chronic periapical infection. Apparently, a very low-grade infection stimulates bone formation or calcification, whereas a middle-grade irritation associated with a tendency to proliferation of soft tissues results in absorption, and an excess of toxic materials or substances produces necrosis with an absence of either absorption or calcification. This tendency is modified by two other factors: (1) a certain degree of individuality, determined probably by the reaction of the cells of the host to infection so that in one person absorption predominates, whereas in another, calcification does and (2) the fact that different bacteria cause varying types of reaction. The pyorrhea type of infection produces both absorption and calcification to a marked degree; resolution of the crest of the alveolar process and adjacent regions,

and condensation of the jaw bones toward the apex and beyond.

Bone and tooth absorption is a most interesting process, not only because it produces shadows in the radiograph, but also because of the method by which it is accomplished. It is usually stated that there are three types of absorption: (a) cellular or osteoclastic; (b) fibrous, in which the calcified tissue is replaced by or is converted directly into fibrous tissue, and (c) a diffuse absorption of the lime salts without destruction of the matrix. The pathologic absorption commonly associated with periapical infections is of the first type and is associated, typically, with the presence of numerous giant cells, so-called osteoclasts, and an abundant blood supply. Occasionally, fibrous tissue cells or even leukocytes, instead of the giant cells, are seen adjacent to the regions of absorption. I have never seen active absorption in the necrotic type of infection; that is, in the presence of accumulations of pus, neither pus-soaked root-ends nor

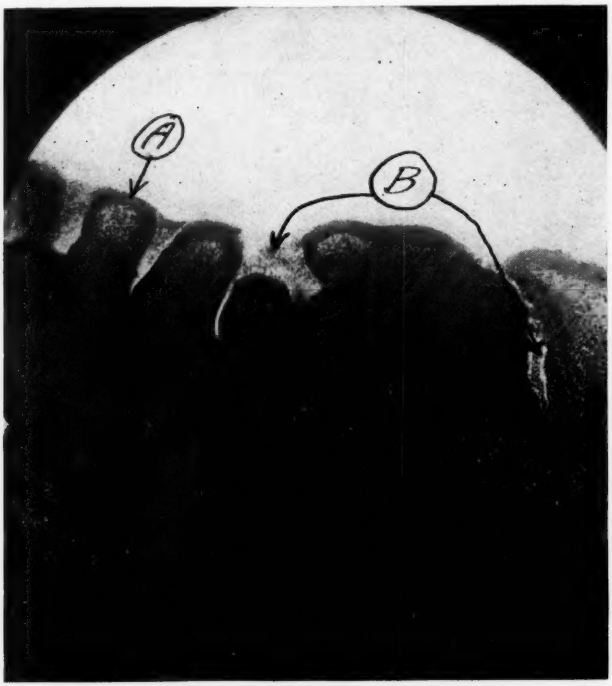



Fig. 2.—Periapical infection with marked bone absorption including all of the bone between the apex of an upper tooth and the maxillary sinus. The infected region, including part of the sinus lining, came away with the extracted tooth. The epithelial lining (*A*) acts as a more efficient barrier than the bony wall; in this case, this last barrier has been penetrated by the infection at many places (*B*). Such infections extend locally rather than generally, and cause prominent shadows in radiograms. The body of the infected region is firm and not purulent (*C*).

pus-soaked bone are absorbed. Absorption occurs only in the presence of living cells supplied by an ample circulation.

The structure, therefore, of an infected alveolus of the chronic type, the type which is an important factor in the production of systemic extension, is very characteristic. The infected region consists of a more or less spongy, porous network of fibrous tissue in the meshes of which are small vessels surrounded by zones of accumulations of infiltrating cells made up of plasma cells, small mononuclear round cells and occasional polymorphonuclear leukocytes. The presence of the latter is very significant, because bacteria can usually be demonstrated in the regions in which they occur, and less frequently in the regions dominated by the plasma cells. Cells with eosinophilic granules are also found in these places, a condition that is suggestive of the changes so frequently seen in chronic appendicitis, salpingitis and cholecystitis. Pressed against the bony wall of the tooth socket and the apex of the tooth is a definite fibrous tissue capsule which may be quite thick and which may be traced back to the unchanged periodontal membrane. At this place, fibers which lie adjacent to the apex unite with those that line the bony cavity. There is very frequently a region of excessive calcification or hypercementosis at this junction of the two sets of fibers. The absorbing cells lie between the bone or cementum and this fibrous tissue envelope.

Fig. 3.—An upper second bicuspid. The shadow of a pocket of the maxillary sinus (*A*) was deceptive in that it resembled in the radiogram a periapical defect (cyst or infection).

Fig. 4.—An encapsulated periapical condition beginning as an infection. Not only is the bony wall (*A*) thick, but the cavity is epithelial-lined and the content (*B*) soft; it has become a root cyst. The radiographic shadow is characteristic.

If absorption predominates, new channels may be opened for the spread of the infection into adjacent structures, such as the maxillary sinus, or produce so much destruction of bone as to make the extension of the infection inevitable when operation is undertaken without adapting the procedure to the pathologic anatomy of the lesion. It is not assumed that there is no danger of systemic infection from this second type of alveolar abscess, nor that local secondary manifestations are absent in the first group, as discussed above. The relationship of

the upper bicuspids and molars to the maxillary sinus is of the utmost importance, and it is impossible to make too careful a study of the situation from the anatomic, radiographic and clinical evidence at hand before operating in such cases. The shape of the antrum is highly variable and wonderfully adapted in form, size and location to the roots of these upper teeth.

In this estimate of the sequelae that

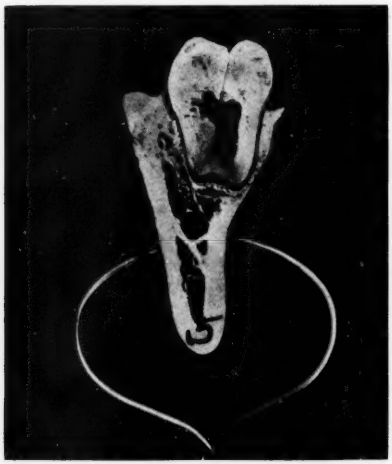


Fig. 5.—An unusual bony change associated with salivary calculus and the related gingivitis.

may result from these two types of lesions, respectively, there is abundant support from other bacteriologists and pathologists, but it has been suggested by a clinician that there is a type of encapsulated root infection without lymphatic drainage into the blood stream and with the blood supply so arranged in the capsule that systemic infection from it is not probable. This view, however, does not correspond with my own observations nor with that of the majority of other observers.

It is a fact that does not need demonstration that dental infection is not always the primary process in focal infection; indeed, these secondary infections are probably more numerous proportionately than is usually believed. Because this is so, something may be said about pulpless teeth. A pulp is essentially a developmental structure for the production of dentin, just as the enamel organ produces the enamel covering of the crown. A permanent human tooth is, therefore, perhaps a compromise structure in the process of evolution and not entirely adapted to its present situation in that its pulp also performs sensory functions, acts as a protective organ, supplies, to a certain degree, nutrition to the adjacent dentin and probably furnishes a trophic nerve supply. If the phase of nutrition is disregarded, and pulpless teeth maintain themselves indefinitely without other nutrition than what they receive from the periodontal membrane, certainly the protection afforded by the sensory mechanism of the pulp is gone, as well as any trophic influence which the pulp nerve may have; also, the atrophy of these nerves after pulp removal extends beyond the pulp ends—how far, no one knows. It does not seem any great assumption to consider pulpless teeth as analogous to other parts of the body which have lost their sensory and trophic nerve supply, and they are more liable to injury and more susceptible to infection. It would seem that there are just two factors that reduce the resistance of the apical regions of pulpless teeth to infection: (1) the ill-advised efforts made to sterilize these regions by unduly drastic procedures, and (2) the replacement of the normal periapical tissues by more or less scar tissue without an adequate nerve supply. Certainly, pulpless teeth in the presence of nearby infection are a decided menace, and in the presence of more remote infection something of a hazard, that hazard depending, if one is inclined at all to accept the notions of Rosenow, on the

character of the distant infection and the selective affinity of the infecting organism for bone and periosteum.

From the histologic structure alone I have never been able to distinguish any difference in the periodontal membranes of uninfected, pulpless teeth and those of healthy teeth with healthy pulps. In infected apices it seems possible histologically to distinguish those in which the infections have arisen from the pulp and those in which the infection has come from an outside source. In the latter, there are no evidences of infection in the pulp stump, and the infiltrated region is definitely separated from the apex by uninfected, healthy tissue.

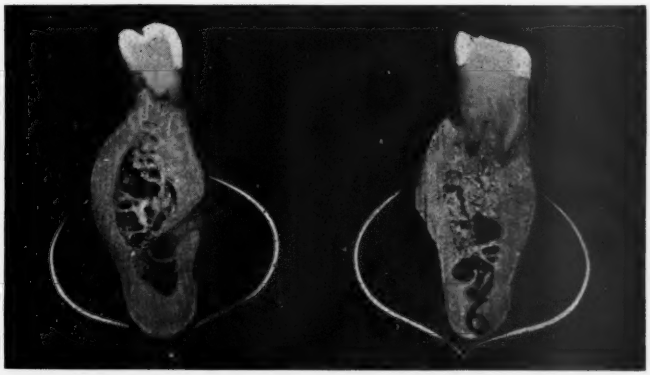


Fig. 6.—Two teeth from a case of pericementitis. Although there is a very noteworthy recession of the alveolar process, this is associated with such a great degree of condensation of the bone about the apices as to hold these teeth firmly in their sockets—almost an ankylosis.

Various schemes founded on various laboratory tests have been proposed for the diagnosis of focal infection, especially of dental origin. Many of these have concerned blood cell counts. Head, Logan, Hecker and, more recently, Torren have investigated these changes in the white blood cells. Apparently Torren is the only one who still advocates the efficacy of this procedure. He finds an increase in the proportion of the large mononuclears in those persons suffering from focal infection of mouth origin. Recently it has been proposed to diagnose chronic appendicitis by a similar procedure. It should be remembered that blood cell counting is a standard diagnostic process, but it does not and cannot furnish specific information. Indeed, it is variable in the same individual in the same condition at different times, and often varies in the same disease in different persons. A very careful examination by Haden of a large number of persons suffering from focal infections, with abundant controls, failed to disclose any typical variations which were the result of periapical infection. This corresponds to the results of more than 500 counts made in our laboratory.

It has been suggested that the examination based on the presence of complement-fixing substances in the blood serum of persons suffering from streptococcic infections may be made use of in the diagnosis especially of dental infections. This method is open to the same objections as blood cell counting, and to the further objection that even in the hands of the most skilled workers it is very unreliable, and therefore its per-

centage of failures is high. This test is made like the Wassermann examination for syphilis, except that instead of the lipoid antigen, an antigen consisting of a suspension of streptococci is used.

Lately, DeNiord and Bixby have suggested that there is a retention of blood uric acid in focal infection, and not only that there is a retention but that the amount of this retention is proportional to the number of infected regions. In their hands, the test did not fail in any of the cases reported by them, all of which were under hospital regimen. Also, the blood uric acid did not reach a normal level in these cases until one or more operative procedures were carried out to eradicate different regions of infection, such as teeth, tonsils and appendixes. A recent careful examination of more than 100 persons by Mueller at Northwestern University Dental School failed to prove the value of this test. It is true that there is an increase in the blood uric acid content in a certain proportion of chronic infections, but it is very uncertain, even more so than the blood cell counts. An increase seems to be much more significant of lessened secretion because of some kidney defect; in other words, its retention is suggestive of some degree of nephritis rather than of focal infection. This contention is borne out by a recent investigation of Habbard and Finner, who conclude, "It can be said that in only a relatively small percentage of cases which contained an increased amount of uric acid in the blood further evidence of nephritis could not be found." We may conclude, therefore, that in the relatively small group in which there is no evidence of nephritis, this procedure may have some diagnostic value. But focal infection may and frequently does occur without any retention of uric acid in the blood.

One cannot leave the subject of diagnosis without some discussion of roentgen-ray examinations. The emphasis laid on the menace of the small encapsulated infections surrounded by dense, bony walls earlier in this paper is especially important in this connection, because of the relative insignificance of the shadows cast by them. Indeed, there may be no radiographic evidence of infection. In other words, radiographs do not diagnose infection, and bacteria cannot be seen in them. On the other hand, deceptive shadows may be cast by adjacent structures, and unless carefully checked clinically, too great dependence on the film may lead to embarrassing mistakes.

Diagnosis is a highly individual, clinical process which may be aided by laboratory tests, but the individual factors are all highly variable. A correct estimate of the condition actually existing can be arrived at only by a very careful analysis of all the facts at hand. Billings has stated this so well for the medical practitioner, and I feel that this is also so applicable to the practice of dentistry with but little change that I quote his paragraph:

"Diagnosis is the most important factor in the practice of medicine. Until the diagnosis is made, treatment may be ineffectual and often is irrational. Modern medical science is characterized by the development of many laboratory and instrumental methods of diagnosis. Concerning these I repeat what has been said on several occasions: With due regard for the value and need of all the splendid methods of physical and functional diagnosis in investigatory medical work, they are needed in the routine clinical care of not to exceed 20 per cent of all the patients of any urban or rural community. Unfortunately, many lay people have been made to believe and apparently a large number of physicians think that the routine application of the ultra-scientific methods of diagnosis is necessary in the majority of cases. The fact is that the diagnosis can be made in fully 80 per cent of all cases by a resourceful practitioner who will efficiently use his brain, special senses, hands and an always available and inexpensive laboratory and instrumental equipment. In a discussion of the means of diagnosis available to the general practitioner, the history

of the past and present condition of the patient is one of the most important, if not the most essential, factor."

## Summary

1. A thorough knowledge of the anatomy, especially of the bony structure, of the jaws in health and disease is necessary to understand the changes that take place in dental infection.

2. Chronic periapical infections may either be associated with condensation of bone and encapsulation or with absorption and localized extension of the infection.

3. Small encapsulated infections are more likely to be associated with systemic involvement.

4. Large, diffuse infections are associated with bone absorption and extend locally rather than by the blood stream and lymph channels to remote parts of the body.

5. Bone absorption occurs only in the presence of living cells and an abundant blood supply.

6. Chronic encapsulated periapical infections have a very definite histologic structure.

7. Infections associated with absorption are easily disseminated by poorly chosen operative procedures.

8. Dental infections are frequently secondary to other foci of infection.

9. Laboratory examinations may be a helpful procedure in the diagnosis of focal infection, but blood cell counts, blood serum tests, blood chemical examinations and roentgen-ray shadows are all frequently fallible.

10. Diagnosis is an individual process of deduction, and a correct conclusion can be arrived at in as many as four-fifths of the cases without resort to complicated laboratory examinations.

## Discussion

*John G. Meisser, Rochester, Minnesota:* There is, I believe, little question in the minds of dentists that infection exists at the apices of pulpless teeth showing evidence of rarefaction, but that infection often exists at the apices of pulpless teeth that are apparently negative in the roentgenogram is not generally believed.

Dr. Hatton has demonstrated that bone density is increased around areas of low-grade infection, and because of this density such teeth do not always show evidence of infection in the roentgenogram. He has also shown that in this type of infection it is easy to demonstrate vessels surrounded by zones of perivascular infiltration. I have had the opportunity to culture many such teeth in patients with systemic diseases that were apparently of focal origin. In our study of such patients we first removed and cultured teeth that showed evidence of infection in the roentgenogram. If animals injected with these cultures developed lesions in organs and tissues similar to those involved in the patients, we then removed these apparently negative but pulpless teeth. Not only were they found to be infected, but it was found that they harbored the same type of bacteria with the same elective affinity for tissues as did the teeth showing evidence of pathology. I believe as Dr. Hatton does, that the fact that infection around such teeth is seldom detected because of bone density does not lessen their menace to health. The bacteria of their toxins are forced into the circulation through the numerous vessels that are present in these very small lesions.

In regard to the chronic encapsulated periapical infection, our histologic findings correspond to those of Dr. Hatton. Furthermore, not only have we reproduced the patient's condition in animals by the injection of bacteria recovered from these encapsulated tooth apices, but also many of our patients have shown remarkable improvement following their removal. We therefore believe that all such infections should be eradicated.

Dr. Hatton stated that dental infections are often secondary to other foci of infection. I am certain that this is true because I have often recovered the same type of bacteria in pure culture from all pulpless teeth in certain mouths, even though these teeth have been treated at different times and by different dentists. It is not likely that they were always infected with the same type of organism, but in all probability they became secondarily infected. Dr. Hatton has demonstrated to us that the resistance of certain pulpless teeth is lowered because of the drastic procedures that are sometimes used in the treatment of pulp canals, thus destroying periapical tissues, or because Nature often replaces the periapical tissues with scar tissue that has an inadequate nerve supply.

Just what percentage of roentgenographically

negative but pulpless teeth may be infected we do not know, but we do know from our experiments on animals that this type of tooth in patients with diseases of focal origin often harbors bacteria that have the power of producing disease similar to that in the patient.

*T. A. Hardgrove, Fond du Lac, Wisconsin:* It is a principle in Nature that encapsulated tissue is practically impervious to the fluids of the body. An encapsulated membrane must get its nutrition through its own blood supply; for instance, the lining of the heart must, and it does, receive its nutrition through its own circulation. Likewise, the capsule of the kidney and the lining of the lungs are the same. Now, then, if it is true, as Dr. Hatton has indicated, that in the case of condensed bone we have an effort at encapsulation of the bone, the same principle prevails, and I am inclined to think that he is correct in his conclusions, as we do not find an extension of the infected process such as we do where there is no condensation.

As a rule, Nature has two ways of depositing calcium salts; either by a normal method of tissue formation by the osteoblast, or by the method of calcareous degeneration. In order to have a deposit of calcium salts, we must have dead tissue, so that if we have either a condensed area or an extension process, we first have dead tissue, which acts as a nucleus about which calcium is deposited. Dr. Hatton says that the smaller encapsulated areas are more likely to result in systemic diseases. I think that it matters more how dense and how perfect the encapsulation is as to whether it will permit the material to escape into the circulation, and to lodge, as Rosenow says, in the place of its choice.

Contrary to the statement that it makes no difference whether the bacteria are forced into the blood vessel on account of the density of the unyielding bone, or whether they get into the circulation by way of the lymphatic system, it is, I believe, a matter of importance, because if they go through the lymphatic stream, they are apt to be taken up and destroyed by the lymphatic glands before they reach the blood current.

It struck me, as I read this paper, that one feature dealing with periapical infections was not sufficiently stressed, namely, that the patient's immunity is a most important factor in the spread or control of all periapical infections, as well as infection in other places.

When Nature encapsulates or forms a granuloma around infection, she is making a supreme effort to control and to hold in check the invading organism until her immunity to deal with the condition is established.

Bone absorption can take place only in the presence of living cells, but the first part of that process is a dead cell. However, the living cell must ingest and absorb the diseased products with the aid of the blood stream.

Some years ago I was in England, and, talking with Dr. Turner, I asked him what method of treatment was in vogue at that time in the treatment of abscess. In fact, I ask him what medicines he used. He said that English dentists did not use any medicine, but that they drained and cleansed, and I inferred that they let Nature sterilize the field. A cure established that way is more apt to result in a permanent cure than one induced by drugs.

When absorption predominates, the absorbed tissues at once open up the gateway to an extension of the infected process; so, as the absorption extends, the infection extends, and, in the periapical tissue overlying the bicuspids and molars, there is danger of infection extending into the antrum. However, the last layer of bone beneath the antrum seems to be quite hard, or at any rate it does not let the infection through readily.

I do not agree with Dr. Hatton that large, diffused infections are liable to be more localized than the smaller ones. It depends on the type of infection and the patient's immunity, rather than the size of the infection area. Low-grade infections tend toward dense bone, or, as Dr. Hatton says, toward a deposit of calcium; milder ones tend toward vascular soft tissue elaboration, and the still more active ones tend toward actual pus. In streptococcus infection the high white blood count may be absent.

*A. T. Rasmussen, La Crosse, Wisconsin:* Dr. Hatton said that so far as possible the making of pulpless teeth should be prevented, but not abandoned. I have preached the gospel of local infections (that is the term I used before we had adopted the word "focal") in season and out, calling attention to the systemic effects, but I do not believe that every pulpless tooth should be summarily removed without the most careful consideration of the patient's best interests. The fact that a pulpless tooth is not ideal and the further fact that many pulpectomies may be done in a haphazard manner, with little or no regard for asepsis, etc., is no reason for condemning every pulpless tooth in every patient. It is refreshing to know that Dr. Hatton assumes such a rational attitude toward the question of the pulpless tooth.

What interests the patient and what should be first and foremost in the mind of the dentist or surgeon is to get the patient well,

if he is suffering from local or systemic disturbance, and to safeguard his health in the future. In order to do this, I firmly believe that the clinical examination of the patient is of the greatest importance. To get a good clinical picture of the patient, personal and family history must be thoroughly gone into, thereby establishing the probable resistance of the patient. Laboratory findings are important but should not be depended on alone to determine the line of procedure to be followed. The laboratory should be used to check up the clinical findings. In other words, *study the patient.*

The failure to study the patient from a clinical standpoint, I believe, has largely been responsible for the condemnation and removal of many teeth which should be doing good service today. Nature's resistance to disease is the patient's greatest asset. Too often this is overlooked and is overshadowed by laboratory experiments.

In dealing with bone infections one should always remember that we cannot remove infection from the bone. All that we can do is to remove tissue that has become diseased, as far as we are able to determine. It is the duty of the dentist or surgeon to remove what he knows to be hopelessly diseased, as far as that is possible, but that is the "end of his rope." Nature must, in the end, clear up the infection, and Nature must heal. Let us not take upon ourselves the responsibility which Nature has assumed since time began. We cannot do it. If the system is carrying an overload, as much of the load as possible should be removed, and Nature usually treats the patient kindly.

*E. C. Fox, Detroit, Michigan:* I am going to cite several cases, backed up by hospital reports, illustrative of focal infection because of high blood pressure. In a series of eighteen cases taken from one of the leading hospitals of Detroit, the blood pressures ranged from 190 to 224.

These cases were all gone over clinically. Every possible examination had been made, including the usual laboratory tests. The teeth were examined radiographically, and the tonsils are removed. In three cases, the gallbladder and appendix had been removed. In all of these eighteen cases, the small incipient areas were proved radiographically to be the seat of trouble, and on the removal of the infected teeth, the blood pressure subsided to normal.

In another case, the patient had had diabetes for eighteen months. He had been in the hospital under my supervision. Every possible effort was made to save him. Roentgenograms of his teeth were taken because of an irritating third molar. As I remember the case, a lower second molar had been devitalized when he was 16 years of age. This was removed and he quickly recovered from the diabetes. After leaving the hospital for about four months, he came back again with a recurrence of his old trouble. Roentgenograms were taken of his entire mouth, and devitalized teeth were removed; he is now eating candy with immunity.

Two other cases of double iritis were cured within a week after the removal of the upper bicuspids, which in each case were infected, the areas being very small over each tooth.

*Thomas L. Gilmer, Chicago, Illinois:* Since I was one of the original workers who early embraced the theory that infections in the mouth were a menace to the general health, and since I made an early study of the bacteriology of chronic apical infections, I feel that perhaps I have sufficient excuse for criticising what is being done along those lines at this time.

No one believes more fully than I that oral diseases are a cause of secondary infections in other parts of the body, but I do feel that attention is being too much centered on the teeth and jaws, while other foci or other diseases are overlooked.

To illustrate: A patient had for some months been ill. She was losing flesh; her stomach functioned badly, and she was failing generally. Her physical condition was attributed to her teeth, of which several had been removed, but instead of improving, she grew worse. She had been told that pus originating at the apices of her teeth was circulating in her veins. She became obsessed with this thought, and, since she received no benefit from the removal of a few of her teeth, she felt that the remaining teeth must be the cause of her continued illness. I examined her mouth and teeth, and also the radiographs taken before the removal of her teeth. The teeth removed were pulpless, but the roots were well filled and there were no signs of apical infection. I advised her to see a high-grade internist, which she did. After a thorough examination, it was discovered that she had cancer of the stomach too far advanced for any hope from an operation. This is not a unique case. There are many such, not all cancer cases by any means, also those having gallbladder, genitourinary, nasal, maxillary, sphenoidal and other infections.

I fear that, as a result of my early work on focal infections, and my study of the bacteriology of apical infections and animal inocula-

tions, I may, in a measure, be responsible for some of the present overdoing of the subject.

I do not find that all pulpless teeth are infected, and I have discovered that it is extremely difficult to get uncontaminated specimens from the apices of teeth, no matter what the technic; therefore, even though we know the danger of infected teeth, good judgment must govern us in each case.

*M. R. Howard, Denver, Colorado:* Our observations in Colorado have been that patients having tuberculosis of over two years' duration almost invariably have hypercementosis on devitalized teeth. In a large percentage of these cases, this condition has been very marked.

*Theodore Blum, New York, New York:* Dr. Hatton mentioned a case of focal infection which followed an extraction. I am unfortunately in a position to cite to you five cases of a similar nature, in four of which focal infection followed the extraction of the teeth, and in one of which focal infection was found in the pulp cavity of the lower first molar.

We all know that a good many teeth are being extracted, some with sterile instruments and some with unsterile instruments, and that some operators know the technic and others do not, and still in the majority of cases no bad results occur. Should we believe, therefore, that there is something in the excuse which we have been bringing forth, namely, the low resistance on the part of the patient? There must be something that is causing these infections in only a small number of cases.

The important thing to remember is that the teeth are not the most important vehicles of infection as far as the body inwardly is concerned, and for this reason the patient should first be thoroughly examined. By "thoroughly examined," I mean examined from an anatomic standpoint to make sure that there is no other infection beside the one arising from the teeth. I do believe that the teeth are to be removed in these cases only if there is no chance of saving them without endangering the health of the patient.

*L. L. Poston, Council Bluffs, Iowa:* Dr. Hatton said, in substance, that a radiograph was not reliable—that infection could be at the apical region and not show up on the picture. Then, how are we going to know that a devitalized tooth is not poisoning the patient? If the patient shows evidence of systemic poisoning from pus, and if he has any devitalized teeth in his mouth, it is my belief that all the devitalized teeth should be extracted, because, with the skill of the dentist of today, substitutes can be provided that are nearly as good as the natural teeth.

We have no right to advise a patient to keep a tooth if that tooth is a constant menace to his well-being. Dr. Hatton said that the resistance is lowered when a tooth is devitalized, and that a radiograph taken today might not show any trouble, but that if the same tooth were photographed again in two months, it might show serious trouble. What patient have you whom you could ask to come in every two months to have a radiograph made of his teeth? If the resistance of the apical tissues is lowered when the tooth is devitalized, it becomes a menace, and we have no way of knowing when the resistance is going to break down and injure the patient's health.

*Dr. Hatton, (closing):* I still maintain that the clinical history of the past and present conditions, and the examination that one can make is the most important help in arriving at the diagnosis.

# FIXED BRIDGEWORK

By JESSE D. WHITE, D.D.S., St. Louis, Missouri

(Read before the Chicago Dental Society, October 16, 1923)

A consideration of the many phases of fixed bridgework as we see it today demands of the dentist most exacting attention to the mechanical details of construction.

An observation over a period of many years has shown conclusively that, while the trend has been toward betterment, yet, as practiced, in many instances we have not reached the degree of sound restorative principles as in other branches of dentistry.

Standardization of the many intricate problems is in the far-distant future. Regardless of this, the earnest desire of all of us should be to reach a higher grade of perfection in the service we render. It is quite obvious that diagnosis is just as important in a small as in a complicated restoration. Study models should be of as much use in the consideration of abutment teeth and occlusion as roentgenographic interpretation is in root conditions. Of equal importance is thorough prophylaxis; prophylaxis in every sense that the name implies. A perfunctory scaling of visible deposits and brush wheel polishing will not do. Our periodontist friends will agree that a thoroughly polished and cleansed tooth or root with a normal surrounding tissue will assure us the greater degree of permanency in an abutment tooth.

The subject assigned me "Some Phases of Fixed Bridgework Construction" offers many avenues for discussion, especially when the particular phase touches on technic. Apologies shall not be offered for daring to discuss "shell crowns of gold or dowel crowns" or some of the other methods considered obsolete. Test of time and service of any method of restorative practice is the one thing we may base judgment on. If this paper seems to favor some things assumed to be obsolete, consider that the assumption is based on clinical experience and evidence, obtained during a sufficient length of time and contact with these technical features and their relation to the art of bridgework.

## Abutment Teeth

The vital tooth at present is having an interesting time of it. Attachments of increasing variety are being devised in bewildering designs. Alloys of density and degree of hardness ranging from the softness of pure gold to the hardness of steel are being introduced in the race for supremacy between the gold purveyors to dentistry. Pulps are dying either from the repeated impact of occluding teeth on our super-hard restorations or because they have been broiled to death with a stone while in a calm repose induced by the judicious or injudicious use of hypodermic injections.

The devital tooth presents another problem. If our faith in the composite treatment and filling of canals as advocated by such men as Callahan and his disciples has not been misplaced, we feel that we are on safe and sane ground when we make the positive assertion that a pulpless tooth carefully sterilized and filled will make a good bridge abutment so far as the roots are concerned. Necessarily, careful check-ups of such teeth must determine beyond a reasonable doubt whether their retention may work

to the disadvantage of the patient's health.

The progression of caries may govern our choice of attachment. In the molar region, our desire for the maximum of service and permanence of fixation often requires that we use the shell crown of gold: not any shell crown, ready-made or otherwise, but a shell crown that is perfectly adapted to a perfectly prepared tooth. The prerequisites of such a crown for abutment purposes should be a band so rigid that no possible overload may stretch it, a cusp soft enough to afford wear in the inevitable changes of occlusion and a contour not unlike that of the original tooth. The preferable technic recommended is the adaptation of a primary band of pure gold. A secondary band of alloyed gold is fitted over this for establishing contour, and the space between filled with a solder of high carat; the cusp cast of 24 or 22 carat light gold.

This technic may be used on a straight, concave or shoulder preparation, preference being given to a slight concave shoulder on vital teeth. That part of this type of crown coming within the range of vision may have a secondary band cut out at that point for a restoration of baked porcelain or synthetic porcelain cement. As the crown of a devital tooth of long standing is inherently weak and becomes progressively weaker, postanchorages and inlays in most instances are contraindicated.

In the molar region, where peripheral continuity has been destroyed subgingivally, restorative work for the reception of shell crowns should be done most carefully. All grinding, shaping and polishing of the remaining part for the reception of a crown should be done before the preparation of the cavity for alloy or inlay restoration. Preference is given alloy, a seamless copper band matrix being employed for alloy packing. If dowels may be used advantageously for retention of alloy, clasp metal or iridioplatinum wire, 16 or 14 gage should be used. German silver or any of the base metal alloys, whether screw posts or wire, should under no circumstances be used. If copper alloy is desired, the matrix band should be long enough to permit flaps being turned down over the occlusal surface to prevent flow before sufficient time has elapsed for final setting. The cavity surface is treated with 50 per cent solution of silver nitrate. Introduction of alloy by the soft or wiping-in method, continuing with ever-increasing harder masses until all excess mercury is taken up, is the desirable technic. A period of not less than twenty-four hours before removal of the matrix band is allowed. The alloy is then polished, and a period of rest of sufficient length is allowed for the tissues to become normal.

In the incisor, cuspid and bicuspid region, excessive destruction of crown surfaces precludes the successful use of anything other than some type of dowel or jacket crown. An examination of many roentgenograms of teeth or roots in cases in which dowel crowns have been placed show, in the greater percentage of cases, some definite disturbance. In many, we find no trace of canal fillings between dowel and apex. Regardless of the technic and how well these canals may have been filled, the subsequent reaming for the reception of a dowel must in many instances dislodge the filling and plant infection.

The perfected methods for sterilizing and filling the apical portions of any canal that is to receive a dowel are made more perfect if some means are used to prevent dislodgment during the act of reaming. A small amount of any good inlay cement tamped in place will do. Preference is given oxychlorid of zinc. The canal may be enlarged to that point where the apex of the dowel is to rest before the apical portion is filled and cement is inserted.

Dowels of varying shapes and sizes are in use. Some require considerable root destruction. For multicanal and

extremely short single canal roots, short round wire of some proven clasp formula or iridioplatinum, 16 to 14 gage should be used. They should fit the canals snugly and be prepared with a chisel end as a precaution against cement trapping.

Normal single canal roots present the possibility of fracture occurring most frequently on the labial of the basal third. Round wire flattened slightly and filed, tapering throughout its entire length, permits reaming of the canal to a greater depth than for any other type. This dowel of oval cross-section is stronger in the direction of stress imposed. Overloads are distributed throughout the length of the root; while the greater length permits of more positive cement retention.

### Copings

A banded coping of the Richmond type is productive of more or less irritation. Cast bases enjoy an unenviable reputation for inaccuracy of adaptation. Flat plates invariably leave some part of the root base exposed, inviting caries.

I have used for many years the short bevel preparation following the gingival outline. The basal portion is made concave after the Herbst method, with a seating groove dipping from the apex of the peripheral bevel into the canal opening. A confined modeling compound impression is made and a model of cement obtained from this over which to swage the primary coping of 34-24 carat. This is trimmed and burnished to the root. A secondary plate of 32-24 carat is adapted to this, allowing a slight peripheral projection. The two are tacked together, then invested, and the resultant V-shape space is left between that part of the primary cope which is adapted over the bevel, and the projecting extension of the secondary coping is filled with 22 carat solder. This takes a high degree of polish and presents to the free gingival tissues a convex surface reproducing the anatomy existing previous to enamel cleavage.

A similar type of reinforced band and diaphragm advocated by Goslee in an early article on superstructure work for baked porcelain restoration should be used wherever the imperative need of a band is indicated. Why this has not been a standardized procedure in the so-called Richmond dowel crown technic is difficult of understanding.

### Casting

With due respect to the many who have developed, along more or less scientific lines, various casting technics, the devious routes lead back to the principles advanced by Taggart; and it is not within the scope of this paper to discuss that phase. Casting as an adjunct to bridge work, either fixed or removable, stands today the most valuable aid in advanced technic, but we cannot help being concerned with the ever-increasing destruction of abutment teeth by the injudicious use of cast devices for retention purposes.

The faith in the holding powers of cement still prevails to the utmost. Roentgenographic checkups show disintegration at the gingival seat of a large majority of inlays used for bridge anchorage. Simple cavities with small occlusal doll-head retention, with castings devoid of mass strength and teeth poorly prepared for three-quarter crowns with faulty castings, are discouragingly common. The dislodgment from one or both abutment teeth is frequent and recementation at intervals lead to the one end, loss of abutment crowns.

It should be a self-evident fact that cavity preparation after Black as modified for inlays is not, nor has it ever been, a safe procedure for bridge attachments. There are exceptional instances only where stress is broken by occlusal or subocclusal rests in small cases.

Modification of all cavities should include a design for occlusal retention in combination with dentin-grasping facilities. Strategic placement of pits for pins and grooves for lateral wings assists in holding and distributes imposed stress more evenly. Provisions should be made

for the insertion of lock pins through inlays, three-quarter crowns and full crowns on teeth extremely short, to insure against dislodgment.

The area for soldered contact with pontic should provide a means for obtaining the maximum of soldered strength with a minimum of solder. This may be done with the aid of solder pockets and by bridging the space with 12 or 14 gage wire of clasp alloy. Drawn wire has considerable excess of strength over a like bulk of flown solder. An inlay or three-quarter crown may have a wire projection attached at the time of casting, this to engage a pocket in the pontic; or the procedure may be reversed. In either event the port of entry for solder in the act of assemblage is made convenient and the soldered union is in a definite circumscribed area, affording in the finished piece a free septal space.

### Pontics

If one thing is needed in fixed bridges, it is a conservative estimate of the pontic requirements in any given case, it being borne in mind that permanence is the one thing most desired. Esthetics is given the preference over strength much too often in the construction of pontics. The first consideration in designing a pontic is strength; the second, an anatomic form that will function in mastication and provide surfaces easily swept by the brush; and third, esthetics.

I do believe in porcelain contacts with the ridge whenever there is sufficient bulk for strength, and in the anterior region, I can see why a convex surface of highly vitrified porcelain projecting 2 or 3 mm. into the depression of a healing socket is advantageous; but the attempt to place long roots, 7 to 10, or more, mm. into a socket after fresh extraction or a surgically prepared socket deserves a protest.

Some men are able by superior technic to place porcelain roots comfortably in sockets, and may by roentgenograms show that tissues are apparently normal after a period of time. This does not alter the fact that, in the majority of cases, we too frequently see infection in these invaginated sockets; nearly always inflammation of greater or less extent, and the inevitable wastage of process next to abutment teeth as well as between pontics.

One of the besetting sins of the dental profession is to ride hobbies to death. We have had another for the last few years: porcelain roots, porcelain ridge contacts, porcelain morsal surfaces for the posterior and porcelain incisal edges for the anteriors. Some will not wait for tissues to recover from extraction. A small thing such as present infection does not seem to deter one bent on placing a porcelain stopper in the socket.

If it were not a serious menace, I would not call to your attention the generous and benevolent attitude of some of our laboratories who will make us a porcelain root bridge, for so much a root, we retaining the privilege of arranging the sockets to fit. A tooth manufacturer is also ready to supply you with a combination facing and root. We feel about the same amount of sympathy for this as we do for the ready-made clasp, the lingual bar, the ready-made gold crown and the mouth wash prescription pad with its dotted line.

### Occluding Surfaces

*Traumatic Occlusion*—A study of occluding surfaces shows abutment teeth in abnormal occlusion invariably. Teeth opposing the abutment teeth and endentulous spaces often require a certain amount of grinding so that the new restoration will function properly. Abutment teeth interlocking and taking an overload in lateral movement of the mandible require a sufficient amount of trimming away so that the tooth is taken out of occlusion. Abutment teeth showing excess movement should be trimmed at the site of all worn facets, this to be repeated at intervals until the teeth offer normal resistance. At this time only should preparation for attachments begin.

Periods of rest between these readjustments of occlusal surfaces are essential for examination and checkup of conditions.

In the construction of abutment pieces in which some type of inlay, hood or three-quarter crown is used, the larger the occluding surface, the greater the need for a soft material.

A desirable technic is the combination of a skeleton of rigid platinum-palladium-gold-alloy placed at the convenient points for the development of strength with occluding and marginal surfaces of 24-carat gold, or 22-carat light gold.

Thin anterior attachments of hard alloys may have the portion that will come in contact with opposing teeth covered with 24-carat which may be done easily by sweating.

*Obtaining Occlusion*—After abutment attachments are in place the step that will make for accuracy is the obtaining of correct occlusion: bite taking, so-called, may be one of the squash variety. If you believe in this method, we recommend an equal bolus of bite material for the opposite side. This will force the patient to bring the teeth into central occlusion. Squash bites may be improved by placing three layers of No. 10 tin foil or one layer of china silk in the center of a wax bolus to prevent teeth cutting through. The modeling compound is placed between abutments up to the occlusal plane to reduce the thickness of wax and minimize confined latent elasticity. A disk is used to pull the wax in close contact with the lingual surfaces after closure.

Probably the best method and the one productive of more nearly perfect results is the occlusion of full models of both arches regardless of the size or the location of bridges. Models opposing bridges should be of the "stone compound" or of fusible metal. The facets of wear will invariably show landmarks sufficient for articulating and mounting. The latter should be done on one of the anatomic types. If those depending on commercial laboratory assistance would send occluded models with attachments in place we would see better bridges and the laboratory man's lot would be happier. Have you ever seen the morning mail come into a commercial dental laboratory? Take a half day off some time. It is quite an illuminating experience. It would occur to you why every laboratory needs an official guesser.

### Assemblage

If attachments and pontics are removed from the cast, an accurate guide block is necessary for rearrangement of relationship. All edges of attachments coming in contact with the tooth or cavity preparation are coated with antiflux. A minimum of hard sticky wax is used to sustain the relation during investing. If a cast is of investment material and is to be trimmed down and reinvested with attachments and pontic in place, antiflux should be painted on all marginal edges of attachments before investing. To facilitate soldering and reduce to a minimum the chances of distortion in the act of heating and soldering, the mass of investment material should be no larger than necessary to hold parts together. As the material is weak and subject to fracture in small masses, a tray of Alundum cement is used for supporting the investment. These trays are readily shaped to meet individual requirements. The Alundum cement and R. R. Alundum (60 mesh), equal parts, are mixed with water and thoroughly spatulated and kneaded to the consistency of modeling clay. After the desired shapes are obtained, the trays are allowed to dry at room temperature, and then heat, gradually increased is applied, with a final setting of intense blowpipe flame. This type of tray is superior to any metal device for the retention and reduction of the investment mass. The tray is moistened before the investment is added, and the investment is trimmed so that ports of entry for solder are flared sufficiently to prevent

deflection of the blowpipe flame. Wax is removed with a forced stream of hot water and, while still hot, chloroform is applied with a dropper. The heat agitation of the chloroform will throw out and dissipate all traces of wax and grease. This will permit the liquid flux to flow to all points where solder is required.

The heating of the investment prior to soldering is to be done at a low temperature, 300 F. being sufficient. Any heating device that forces the temperature to rise rapidly is detrimental. Cracking or expansion often results in change of relationship in attachments. Employment of an intense blowpipe flame, with prolonged application, invariably causes warpage or an arching of the bridge. As our present methods of pontic and attachment assemblage require the minimum of solder, the act of soldering may be performed quickly with less liability of distortion if we make use of what may be termed spot soldering. An oxyhydrogen or prestolite blowpipe, with a small tip, is used to heat quickly the soldering area and flow solder. A carat of not less than 22 is indicated in all cases.

### Cementation

All exposed surfaces of dentin are thoroughly washed with acetone followed with alcohol. An excess of heated air should never be applied. A gentle flow of air from an open tube is preferable to the hot air syringe. Chilled slabs for mixing cements will retard crystallization and allow sufficient time to force the bridge into position without danger of the cement jamming. Many times, bridges of mechanical perfection are ruined at this critical moment.

### Service

Bridgework of any type needs service. We should see patients at frequent intervals until satisfied that occlusion is perfect. Facets of wear near the incisal edges of the facing will exert a pressure against a cemented porcelain facing that will soon cause fracture. These should be watched and cut away. Porcelain occlusal surfaces are tested with paint or articulating paper for riding points that increase strain.

An anatomic articulator does not always tell the story of occlusion when put to work in the mouth. As few dentists enjoy the cooperation of the periodontist, the duty of teaching the patient how to clean bridgework lies entirely with the dentist. Few patients know how. If the dentist believes prophylaxis is of sufficient importance in obtaining for his bridge a life of service much longer than if neglect has undisputed sway, he will see his patients and his bridges often.

### Discussion

*Hart J. Goslee, Chicago, Ill.:* It is refreshing to listen to a paper so absolutely devoid of fads and fancies and so teeming with rational, practical thoughts. I think that Dr. White made a correct statement when he said that a few years ago it would have required courage for anyone to read a paper on fixed bridgework in almost any part of the country excepting Chicago, and I wish to thank Dr. White on behalf of the dentists of Chicago for his kindly reference to the conservatism of the dentists of this city. It has been most gratifying to me always to feel that the dentists of Chicago were less inclined to run to fads than the dentists in any other city in this country. It is only within the last few years that anyone has dared to say publicly that he made fixed bridgework, or go so far as to admit that he still used gold telescope crowns or full dowel crowns. If he had done so, he would be criticized most severely. In fact, men who were frank enough to admit they still did work of this type have been classified as "has-beens."

A few years ago, a movement was started which has resulted most favorably, although quite unexpectedly, I imagine, to those who started it. I refer to the propaganda for removable bridgework. Those who started this propaganda, in the first place, took two definite points upon which to base their arguments in favor of removable structures and in condemnation of fixed structures. Their first argument was that the partial immobilization, or fixation, of the natural teeth was positively injurious to their longevity and to the health of their investing tissues. They dwelt most enthusiastically on that particular phase, and then, in supplement, they brought up the consideration of sanitation. If they had been far-sighted enough to place sanitation first, their premises would have been

taken to much better advantage, because, the statement that the partial immobilization of the roots of teeth was a positive menace to health, has, I think, been proved wrong. In support of their theory they made the claim that there was nothing in the human economy analogous to the immobilization of any tissue or tissues which move in functioning. Such a statement is true as applied to all other tissues which move in functioning, but it does not apply to the teeth in the experience of those who have observed the results of clinical experience. Those who have had extended clinical experience in the construction and application of fixed bridgework, and those who have been keenly observing have no doubt as to the usefulness of this particular type of work. Had these advocates of removable structures confined their propaganda entirely to the question of sanitation, they would have stood upon much sounder ground than when they placed partial immobilization of teeth as their first and most prominent premise. We have learned from this propaganda that the whole country is now in favor of fixed bridgework and that all are doing this work better than they ever did before, and therefore we owe thanks to the so-called "new" school for calling to our attention the advantages together with the possible disadvantages of fixed bridgework as constructed in the vast majority of cases for the past twenty or thirty years. As a result of the teachings of this so-called new school, everyone who now builds fixed structures of any type pays more attention than he ever did before to adaptation in order to avoid the possibilities of mechanical irritation, and to provide means which will insure sanitation. If we do build our fixed bridges with these thoughts in view we are safe. There will always be a place of usefulness for structures of this type, and we will not do great injury to the supporting natural teeth if we build them along strictly mechanical lines and observe the requirements as I have indicated.

It is impossible to question the theories or technical details that have been here presented. It is therefore difficult to discuss such a paper only to say that I heartily agree with everything the essayist has said, with one exception: the reference to pulpless teeth as "devital" teeth. Devital teeth means "dead" teeth, and teeth the pulps of which have been removed are not dead. I agree with him that pulpless teeth, properly treated, are dependable teeth for the support of fixed structures if the structures are built along proper lines. However, I would not be understood as recommending the devitalization of the pulp of a tooth unless it is absolutely necessary.

A few thoughts presented by the essayist might be emphasized because they are of much practical value. How many of you have ever thought of making the occlusal surfaces of your abutments of soft gold, in order that it may wear down proportionately with the remaining natural teeth as they wear down during their lifetime? I do not believe pure gold will withstand the necessary stress of mastication, but I do think we should use softer gold more frequently than many of us have been using it in the past, and that if we do, less soreness will develop in the teeth which support both fixed and removable structures.

What Dr. White said with regard to service is absolutely true. Many operators who construct bridgework of all types fail in one very important feature, and that is, giving to the patient who wears such a structure the proper advice as to how it should and may be kept clean. Our duty does not cease when we have replaced missing teeth and restored lost tooth structure, and even though we feel that the restorations we make will offer every assurance of favorable permanency, our duty does not cease until we have instructed the patient as to the absolute necessity for observing scrupulous sanitation.

*T. B. Kurtz, Chicago, Ill.:* We have continued to condemn crowns because of misfits, but the causes of those misfits are to be laid to careless operators. It is not the fault of the technic we are using, but the fault or neglect of the men putting on these crowns to prepare the roots properly for the reception of the crowns. If we could all appreciate the necessity of careful preparation of teeth rather than putting up with a haphazard manner of covering them with cement and highly polished metal, better crown and bridgework would be done.

In the matter of attachments for vital teeth, this is a distinct step forward in crown and bridgework, and the casting process is accomplishing something better than any other means has so far. In the use of three-quarter crowns or inlays, preparations for permanent retention must have the walls as nearly parallel as possible, but allowing the withdrawal of the wax pattern. We must remember that these pieces we apply to the teeth do not always bear the same conditions that a simple three-quarter crown or inlay would have to bear in that same location of the mouth when surrounded by the natural teeth.

As to extension for prevention as applied to filling operations—we cannot apply this too forcibly to abutments for bridges. We are soldering a pontic on a casting, and it is common to see the solder extending from the pontic directly to the margin of the casting, making it impossible to finish the margin of the casting after it is seated in the cavity. With

further extension of the cavity onto the angles of the tooth than for an ordinary inlay, we would not only find an area more easily kept clean but also would have an area where the excursion of food in mastication would naturally clean the surfaces of the inlay. If applied to attachments for bridgework, extension should be carried far enough onto the surfaces to make it easy for the operator to finish the margins of the casting after the bridge abutment is seated in the cavity. That will make it possible for the patient and for the food to keep the margins absolutely clean. This guards against recurrence of decay. No matter how perfect the adaptation, great care must be given the piece of work afterward. Every piece of work placed in a patient's mouth should be given proper care by the patient. Failures that prevent a piece of work from doing what it should are not always due to lack of care on the part of the dentist; there is a certain responsibility on the part of the patient in regard to that piece of work in seeing that it continues to give the service it was intended for.

*Stanley J. Tylman, Chicago, Ill.:* The standardization of many intricate problems is in the far-distant future, not standardization of technic but of the underlying principles first. Methods may vary according to the judgment of various men, but in any method the technic must be correct.

Pulps die under repeated impact of occluding teeth on hard gold restoration, or teeth overheated with stone. This is true in both cases, but is this not rather to be laid to faulty technic than to employment of hard gold, and proper occlusion to be established, with subsequent roentgenographic and study models checked up to take down high points of interference. The pulp will remain vital; and not only the pulp, but also the investing, supporting and periapical tissues remain normal. Overheating can easily be controlled by a stream of warm water and a reasonable amount of care.

A carefully sterilized and filled root will make a good bridge abutment. This is contingent upon several factors; namely, the patient's vitality, resistance, recuperative power, age, general health; also the condition of the pulp previous to treatment; and likewise the condition of the supporting, investing and periapical tissues.

A banded coping of the Richmond type is productive of more or less irritation. This is true of any crown whose gingival periphery does not meet the best preparation in a butt joint, thereby establishing a continuity of surface against which the investing tissues can lie without being irritated. Such a crown is possible, and is being used wherever a Richmond crown is indicated. The crown and technic which Dr. White has described is an improvement over the banded type; yet he might go one step further, and instead of merely using the short bevel, might cut a shoulder of 0.5 to 1 mm. in width around the root periphery below the gum line. The same technic of impression taking, amalgam die and swaging follows, with this exception: First swage a primary coping of 36-gage, 24-carat gold on the die, burnishing it to fit the shoulder perfectly, and leaving an overlap gingivally of 0.5 mm. A secondary coping of 32-gage, 24-carat, is adapted over this, extending only to the outer periphery of the shoulder. These are soldered together, letting 22-carat solder flow over the gingival overlap. A dowel is fitted and soldered to the coping. When the crown is finished, the overlap of 0.5 mm. is ground away to the outer periphery, leaving a butt joint as in a porcelain jacket crown. This insures against any overhang irritation, yet the strength of the banded crown is retained. The difference is that in this kind of crown the binding strength is 0.5 mm. inward from the outer surface of the root. Those who prefer can cast a coping over this preparation.

Cavity preparation after Black, as modified for inlays, is not and never has been a safe procedure for bridge attachment. Modification of cavities should include placement of pits for pins and grooves for lateral wings to assist in holding and distributing imposed stress more evenly. Provision should be made for inserting lock pins through inlays, three-quarters and full crowns in short teeth.

While details of preparation may have been modified, the basic principles of cavity preparation are the same as taught by Dr. G. V. Black.

Let us also consider the factors that determine the success or failure of attachments on vital teeth with reference to dislodgment, etc. First, do we diagnose our case thoroughly by studying the stress of occlusion, the alinement of the abutment teeth, and the physical aspect of the tooth itself as to size, and shape of crown? To meet this stress of occlusion, do we prepare stones at right angles to the applied forces? If we do not, even an iridioplatinum pin will not prevent dislodgment. Likewise, in deciding on our abutments, do we determine the type to be used by the fact that a more tense frictional grip is secured in a long, well formed bicuspid, for instance, than in a short bell-shaped crown, necessitating a three-quarters or full crown in the latter, whereas a mesioclusodistal would suffice in the former? Another factor in dislodging abutments is our failure to reestablish normal occlusion, thereby subjecting the attachment to an abnormal strain.

Dr. White has cautioned us against the dangers of porcelain roots, and rightly so. Unless we know when to use them and how to construct them, we had better not use them at all; but let me say in their favor that when, after extraction, the supporting tissues are normal and strong, and no pathologic condition remains which might cause secondary infection, a properly constructed and placed porcelain tip gives us an ideal pontic. In the majority of cases, it is better to let the tissues heal, and then construct the tip to impinge slightly against the tissues. An overglazed tip is absolutely hygienic.

Another factor entering into the success or failure of the bridge is the width of the lingual embrasures and the cutting of sluiceways through the marginal ridge which permit the food to pass lingually over the interproximal tissue, after it has been crushed between the occlusal surfaces. These surfaces should not be wider buccolingually than one-half the greatest buccolingual diameter of the tooth. Remember, the abutment teeth are already overtaxed.

As Dr. White says, every type of bridge needs service, and unless we give this, noting whether in a year or two the abutment teeth remain vital and whether the investing, supporting and periapical tissues are functioning normally and making with subsequent roentgenographic examinations, we are failing in our duty to our patients and ourselves.

*Robert E. MacBoyle, Chicago, Ill.:* My experience has forced me to believe that at the present time there is a new order of things in the line of fixed bridgework, and it is the duty of dentists today to recognize that new order, and, regardless of the types of abutment pieces we use, whether they be shell crowns, dowel crowns, three-quarter crowns, or what not, there are a few fundamental things which we should give our attention if we continue to use fixed bridgework. One important thing is the conservation of the pulps when we have vital teeth to deal with. Dr. White spoke of telescope crowns and dowel crowns. As long as we retain pulpless teeth in the mouth, there will probably be use for the dowel crown and shell crown, and I believe with Dr. White that there is when properly used no better abutment piece for a fixed bridge than those crowns. But we are presented today with vital teeth in the majority of cases in our restorative work, where we are restoring teeth in small spaces, a few here and a few there, or one possibly where the extraction of a pulpless tooth has taken place, and we are left to deal with vital teeth. We used to teach the devitalization of all pulps in all cases of teeth to be used for fixed bridges, and the contrary is true today. We also should not mutilate excessively these vital teeth in the preparation for our abutment pieces. If we do excessively mutilate them, we can expect the death of pulps in many instances which is occurring today. I believe in many instances the preparation for the ordinary three-quarter crown is excessive.

A third phase which I might mention, if we are to continue to use fixed bridgework, is that we must not irritate the soft gingival tissues regardless of the type of our abutment pieces. These soft tissues must be guarded and not irritated. We have learned that by the use of the roentgen ray in recent years.

Dr. White has spoken of the matter of occlusion. You dentists who heard the paper and the results he gave will appreciate what that means. It is a fact that many dentists do not realize the importance of a properly balanced occlusion upon fixed bridges. There are more good teeth lost from improper and abnormal occlusion—traumatic occlusion—than we realize. When we mount a crown or a bridge, we do not know whether the occlusion is correct or not. It is our duty, as Dr. White has suggested, to have the patient return, not once but probably several times, so that we may check up on the occlusion, a most important phase of fixed bridgework.

The type of pontics which we use to supply missing teeth should give us the anatomic occlusion necessary for the bridge, but possibly one of the most important features of the pontic is that it should be one which may be cleansed by the patient. Recalling the abominable bridges which we see every day in the mouths of people, it is no wonder that fixed bridgework has been condemned.

*Dr. White (closing):* I think we are all agreed that there can be no standardization of technic. Variations of technic are limited by the number of dentists. Each has his favorite method. Standardization of fundamental principles is the thing to look forward to. No two men engaged in teaching crown and bridgework present the subject with any degree of similarity. Palladium is the great offending content of our alloys today. Pure gold occluding surfaces may be too soft in some months; 22-carat light gold is sufficiently hard in most cases. The relation of all types of pontics to all types of attachments should be such as to permit proper cleansing.

Allow me to again stress the point that patients should be seen at intervals of a few days, not weeks, until you are satisfied that occluding surfaces are properly adjusted.

# MOUTH HYGIENE AS PART OF THE CURRICULUM IN THE BRIDGEPORT PUBLIC SCHOOLS

By WINIFRED A. HART,* R.N., D.H., Bridgeport, Connecticut

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

HOW to make effective the teaching of mouth hygiene to school children to obtain the best results has been the problem of those in charge of the work in the Bridgeport Public Schools, and although we do not claim that our system is perfect, we feel sure that we are on the right track, and results obtained each year are more and more convincing. When the subject of mouth hygiene is regarded as part of the curriculum, it assumes a place of importance in school life, and giving the hygienists certificates as "special teachers," increases the dignity of their position in relation to the school faculty and adds greater weight to what they are teaching. The basis of preventive dentistry and mouth hygiene is education, and when you study from all points what must be taught, it covers a tremendous field. We divide the teaching into sanitation, dietetics and health habits.

## Sanitation; Clinic Room Work

Bridgeport has thirty-one elementary schools, thirty of which have well-equipped clinic rooms for the hygienists. In all the new school buildings, special rooms are built, of the most sanitary type, with sinks, gas, electricity, etc. In the old buildings, if there was a small unused room, it was remodeled for us, and when such a room was not available and there was a light, clean, dry, basement, a corner of this was boarded off and a floor laid, and plumbing, gas and electricity were installed. These make very comfortable working quarters, and as far as possible, they are kept separate from those of the school nurse, as both workers at times need to have interviews with children which require privacy.

Our equipment is not expensive, and everything is portable. We use a portable chair in all clinic rooms, a foot engine, small cabinets made by a local carpenter, stools (for all hygienists are taught to work sitting down), sterilizers and all the small things necessary for prophylaxis. Movable equipment is most essential, as the schools are of such varying sizes that it is frequently necessary to take the equipment from a small school to a larger one so that two hygienists may work together.

At the present time, the board of education has a corps of twenty-three hygienists, two dentists and one supervisor. In the seven largest schools, a resident hygienist is on duty every day from 8:45 a. m. to 4 p. m. The other schools, according to size, are allotted from two to three days a week of a hygienist's time, so that, throughout the entire school year, the work is being carried on in every

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school building. This is an important feature of our work, as it keeps the hygienist in direct touch with the children forty weeks in a year, and seeing her simply walk through the corridor in her white uniform is often a reminder to a careless child to brush the teeth or to keep a forgotten appointment with the dentist. We have noticed much difference in the care the children give their mouths, if, for some reason, the program is discontinued in a school for several weeks.

The prophylactic work is confined to the first five grades during the school year, and we plan to give each child two treatments a year. In order to give the older children in the sixth, seventh and eighth grades and also those in high school an opportunity to benefit by this instruction and prophylaxis, we have the corps work from five to six weeks in the summer, establishing twelve clinics in school buildings in various parts of the city. Two hygienists work together at this time, and appointments are made with a large majority of the children in the elementary schools before school closes; while the high school pupils come to the clinics and make their appointments as they would in a dentist's office. The prophylaxis during school hours is carried on so that little or no interruption is made in the classroom work. For instance, when the hygienist is ready to give the fifth grade prophylaxis, she notifies the teacher, and one pupil is sent to the clinic room, remaining there for the period necessary for prophylaxis, thirty to forty-five minutes, according to the condition of the mouth, and returning to the classroom with the request, "one more, please," and so on until all the pupils in a room have been given attention.

The first procedure is to make a thorough examination of the mouth, and chart all conditions found. The chart, after being copied on the permanent school record, is sent home by the pupil to the parents. If cavities are found the hygienist questions the pupil on the financial status of the family, to find out whether they can afford to go to their own dentist or to the dispensary clinic. A leaflet is sent home explaining the latter and giving the eligibility rules for admittance. All these cases are frequently checked up, to see if they are going to the dentist and if appointments are being kept, and when the work is completed, the children are required to report to the hygienist so that the chart record may be changed.

The prophylactic treatment is a wonderful opportunity for educational work. If one section of the mouth shows poor care, a demonstration can be given to correct this. The question of the present diet and the proper foods to eat are talked of and as most of the children watch the operation in a small hand mirror, the names of the teeth are taught as they are being worked on.

Toothbrush drills are given in the classroom, children being notified the session before to bring their brushes to school, or else money to buy a new one. This drill is only to learn the correct way to hold the brush, the proper position in the mouth to reach each section and the different motions to use. During the classroom drill, much instruction is given in the home care of the mouth, in the use of dentifrices and a mouth wash, care of brush and as to times to clean the teeth. A great deal of follow-up work with regard to this is done by the classroom teachers, and many devices and games have been organized by them to stimulate the children's interest. The usual procedure is as follows: After

roll call in the morning, the question is asked, "How many brushed their teeth?" The number of raised hands is counted and recorded on the blackboard, and percentages by the week and month are kept. Some buildings have a banner which rooms compete for; in others a large chart is placed in the main corridor where room records are kept for all to see, and other buildings have other devices.

Those of you who deal with children know that this phase of the work cannot be successful without a "check up." A child gives an affirmative answer knowing it will please the teacher, so at unexpected times hygienists visit the rooms and make a rapid examination of the teeth to see if all are truthful. I have mentioned, in passing, the dispensary clinic. Here we have a wonderful institution and the only one of its kind in the east. In a building specially planned, we have a clinic for practically every physical defect, and each is in charge of one of our best specialists. It is maintained by the city, and the poor can have access to the best skill obtainable. There is a reparative dental clinic with three dentists working all the time, and we refer hundreds of cases to this clinic. The eligibility rules are: The parents must not own property, must not have over $7.00 a person each week, and they must pay a nominal charge for the work—from 25 cents to $1.00 for filling a cavity, and 35 cents for extraction with an anesthetic. In the past year, there have been 7,142 appointments with children, who had 7,242 alloy fillings, and 1,849 permanent and 1,921 deciduous teeth extracted. For this work, they paid, during the year, $2,003.86. Half-hour appointments are usually given, so that time lost from school will not be great. The majority of these children have been sent in from the schools by our corps. Should children be unable to pay this nominal fee, their names are given to the charity department, who, after investigation, will O. K. them for free work. The close cooperation of this clinic simplifies the problem of reparative dentistry.

The two school dentists of our corps work in the school buildings and confine their efforts to the second grade children as far as any fillings are concerned, working only on the first permanent molars. This service is for all children in this grade whose parents wish to avail themselves of it. It is done for the educational value of calling attention to these molars and showing that they are the first permanent teeth and of great importance. To keep the mouths in a sanitary condition, they extract all abscessed deciduous teeth for any child in the first five grades. Another phase of their work is lecturing to the pupils in the sixth, seventh and eighth grades. This past year, 132 talks were given on "The Importance of Filling Small Cavities," at which 5,158 pupils were present.

The accompanying short statistical table will give an idea of the amount of work done in a school year by these two dentists.

SUMMARY OF WORK DONE IN SCHOOL YEAR BY TWO DENTISTS AND BY HYGIENISTS

*Dentists*

| | |
|---|---|
| Individual children having teeth filled | 857 |
| Sittings | 1,956 |
| Alloy fillings | 3,414 |
| Permanent molars filled | 1,913 |
| Extractions of loose deciduous teeth | 1,021 |
| Treatments for pain in children above second grade | 81 |
| Extractions of abscessed deciduous teeth | 2,215 |
| Children having abscessed deciduous teeth | 1,355 |

*Hygienists*

| | |
|---|---|
| Children receiving prophylaxis | 19,776 |
| Prophylactic treatments | 26,359 |
| Children present at toothbrush drills | 25,226 |

This year, according to our state law, all school children had to be tested for

eyesight, and the hygienists for the first time conducted these tests after being carefully instructed by an eye specialist as to the best method of doing them.

The school authorities also wished to have accurate knowledge of children with defective hearing, and it was decided that hearing tests should be given at the same time. This work was done in mid-winter, and 15,540 children were given these tests, and records were made.

The supervisor has general supervision over all the work, compiling the weekly, monthly and yearly reports; is in charge of and responsible for the distribution of supplies, and gives classroom lectures to the sixth, seventh and eighth grades, taking for her subject, "The Importance of the Permanent and Deciduous Teeth." This lecture precedes the one given by the dentists and familiarizes the pupils with the teeth, number, name, location, time of eruption, etc.

### Dietetics and Health Habits[1]

Since it was realized that many bodily ills as well as a tremendous amount of dental decay is caused by improper diet, for the past three years a definite program to educate the children in choosing nourishing, wholesome foods has been carried out by the board of education, throughout the entire school system. The information as to the enormous amounts of white sugar, white flour and demineralized cereals that are eaten, with corresponding ill-results, has been used to instruct pupils and parents in correcting their dietary. Efforts were made to interest a local customs grinding mill in grinding entire wheat and corn for cereal and flour and placing it on the local market. Splendid cooperation was given us, and after bakers were in a position to produce this wholewheat flour and undegerminated cornmeal, they became interested in making bread, rolls, cookies and muffins from it, so that we would have a source of supply to direct people to. We were then ready for our campaign in the schools, and I know of no better way to advertise anything than to go before a class of children and rouse their enthusiasm for whatever you want them to do.

The part the hygienists have taken in this program is very important. A well arranged schedule of talks was prepared, and they are given in the classrooms in from twenty to thirty-five minute periods, according to the subject and grade. The following is a brief outline of what we teach in each grade.

*Grade 1.*—"Milk and Eggs." In simple language, the source of supply of these products is given and why milk must be clean and why they must drink it. The slogan used is "A quart of milk and an egg a day."

*Grade 2.*—"Good and Bad Table Manners." A twenty-minute talk, illustrated by sketches drawn by a local cartoonist, on the importance of clean hands before eating, posture at table, holding knives and forks correctly, eating slowly and masticating thoroughly.

"Sugar, Refined and Natural." In this grade, we find the largest percentage of candy eaters. So this talk is on white sugar and candy, explaining the detrimental effect on the teeth, and recommending all the foods that can be eaten to obtain sugar in its natural state, such as honey, maple sugar, maple syrup, fruits, figs, dates and raisins.

*Grade 3.*—"Vegetables and Fruit." A clever little fairy story written by one of the hygienists is presented showing the important part these foods play in making healthy boys and girls.

"Cleanliness." This is another story bringing in health habits relating to cleanliness.

1. The latter is taught by classroom teacher.

*Grade 4.*—"Posture." By charts and demonstrations, the correct manner of standing and sitting is shown.

"Exercise in the Sunlight." This is a rather spectacular talk, the hygienist impersonating sunlight and telling the children what fresh air and sunlight will do for them.

"Deformities of the Mouth." What thumb sucking, use of pacifiers and premature loss of deciduous teeth or first permanent molars will do to deform the mouth is emphasized.

*Grade 5.*—Here we do the greatest amount of educational work, using the talks given in the previous grades as a foundation.

"The Story of Tiny Tim." A cleverly written rhyme by a hygienist shows the growth of a boy from birth until 6 years of age by correct feeding, giving which foods contain the different mineral elements and in what way the body uses them. After these talks the children prepare menus for breakfast, dinner or supper, some written, some illustrated in poster form.

"Preparation and Cooking of Foods." At present, we concentrate on fruits and vegetables, showing how they should be prepared to retain their mineral content.

"Grains for Bread and Cereals." Grains are shown in their natural state, also ground and demineralized. The different parts of the kernels are studied; in this way it is learned what parts are lost for use in refining flours and cereals and in polishing rice.

"The Story of Dental Decay." How decay starts from the outside; the susceptible parts of the teeth, and what changes take place in the enamel when a mucin plaque is not removed are taught.

Besides the foregoing talks, we have original songs, mottoes and a food fun game that they all enjoy enormously. This consists of a large square of beaver board, with a spinning pointer, and printed on this board in a circle are such captions as "I eat whole wheat bread," plus 25 points or "I eat candy," minus 25 points. The boys generally play against the girls. The game is to spin the pointer and wherever it stops, the child must give a good reason why he gets plus 25 for eating whole wheat bread. If he cannot do so, the other side is given the opportunity and if answering correctly scores the plus 25. The winning score is 150 points.

Four years ago, the board of education passed a ruling that no child could pass from the fifth to the sixth grade who had a remediable defect of the eyes, ears, nose, throat, skin or teeth. The dental division required that there be no cavities in the permanent teeth and that the mouth be in a clean, wholesome condition. Practically all the children met this requirement out of the 1,217 who passed last June, but as "civics and health" is one of the four major promotional subjects in all grades, we are now outlining a promotional requirement for every grade, and if the pupils fail to meet the dental requirement and also fail in reading or any other major subject, they do not pass into the next grade. This will have the effect of impressing on the parents the importance of mouth hygiene, for if the child continues to take home a report card with a low mark in this subject, they will soon make an effort to find the reason for it.

Slowly but surely the statistics gathered each year are proving that we are reducing the percentage of dental caries in the mouths of our children. When we take the entire group of pupils in the fifth grade, numbering 5,476 (including those that have been in the schools the full five years and also those who have entered recently and have had

no education in mouth hygiene) and find that they have only 2.8 per cent cavities in their permanent teeth, we feel encouraged to continue the battle and say, "Education Pays."

## Discussion

*Philip R. Thomas, Minneapolis, Minn.:* A thorough reading of the paper presented by Mrs. Hart, tends to produce a feeling of elation over the fact that this wonderful health system outlined emanated from the mind of a member of the dental profession, Dr. Fones. Credit for the teaching and successful application of the health program must be given to the work and genius of those making practical the work in the schools. Think of a city the size of Bridgeport with twenty-three hygienists, two dentists and a supervisor, instilling in the receptive minds of growing children information relative to mouth and general health. Over a period of years, this work has been carried on, from both a reparative and an educational standpoint. The dental profession has been talking about the accomplishment of Dr. Fones in Bridgeport for years, but how many of the talkers are doers? After listening to a description of this work, how many men have gone to the place from whence they came and have attempted any such program for their home town children? Knowing the immense health value of the work being done by the corps of workers in Bridgeport, knowing that problems such as will be met in any city have been worked out successfully in Bridgeport, how many dentists, in the face of the information available relative to the working plans used there, have made any use of the Bridgeport idea? Not many. Why? Because each of us has a seemingly better scheme for doing the work, or at least think we have. The paper presented evidences the fact that a practical, successful demonstration in hygiene education is being made in Bridgeport, yet how inadequate are the attempts being made in other cities. Why not follow the Bridgeport system? Education is the factor which will solve the dental problem. Education of the dentist, education of the parent, but, by far the most important, education of the child. The finest result attained in Bridgeport will be registered in the better health and mouth condition of the children, those potential fathers and mothers now being educated under the wonderful system worked out in Bridgeport.

In the face of results shown, there can be no criticism of the work outlined by the able director of the department of health and hygiene. It only remains for me to say that, from the standpoint of the solution of the problem of dental and health hygiene education from the municipal or state point of view, the work being done in Bridgeport is without a parallel in the world. The only regret one has is the fact that every city in the country cannot have a Fones as president of its board of education, with such co-workers as Mrs. Hart.

I cannot pass by this opportunity to call your attention to the fact that the hygienist is responsible for the results attained under the system here outlined. I have always realized the need of the oral hygienist both in public and in private service for patients. They are showing and have shown conclusively the value of their service. This paper should be a potent factor in the conversion of the opponents of the hygienist movement.

# PUBLICITY METHODS IN ORAL HYGIENE

By REA PROCTOR McGEE, D.D.S., M.D., Pittsburgh, Pennsylvania

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

DR. SAMUEL PEPYS, Jr., says "Dentistry like music, is divided into two parts, vocal and instrumental; vocal has to do with education and publicity, instrumental with the application of treatment to the patient."

Oral hygiene is dentistry applied to the masses. In order for the masses to realize the needs and benefits of dentistry, we must have continuously an ever-increasing volume of publicity. There is much opposition to publicity. This opposition, while it is growing less with time, is still to be reckoned with. There was a day, not far past, when publicity of every kind was looked on as unethical, and yet, if we went further back, we found that the founders of the profession in this country were in the habit of using space in newspapers to notify the people that they were up and doing. Our objection to publicity is simply opposition to the tendency toward exaggeration and untruthful statements that have been used in that connection. So far as publicity itself is concerned, no one can have the slightest real objection, provided the truth is told judiciously and diplomatically, and also that the code of ethics of the dental profession is carefully observed.

We also have opposed to publicity the old "standpatters," who are opposed to everything. It was one of these who gave Johns-Manville the idea of an asbestos lining for brakes.

Inertia is the next obstacle to be overcome. Inertia is simply a polite word for laziness. Then there are some who do not keep sufficiently familiar with the progress their own profession is making, to realize the fact that some of the information that is now taught the public, is actually more advanced than is their own information. And last, but not least, we have with us always, politics, which thrives only where vigorous thought is curbed.

In favor of publicity, we have the consideration of the good of the people, the advancement of dentistry and the hope of greater usefulness. There are so many means of publicity that every list is incomplete after a short period.

First, we have the newspaper, either with original articles or syndicated articles reaching a large number of readers. Many local societies have purchased newspaper space, in which they have inserted ethical advertisements. I have never favored this kind of effort, but the results seem to be good. I believe that every society should have a committee appointed to read all the papers in their district and to study the requirements of newspapers so that they may know what professional information is real news. For a great many years, all references to dentists and dentistry in newspapers were made in a flippant and sometimes jocular manner; the result of which was a lowering of the standing of professional people in the minds of the public. In many respects, the attitude of the press to doctors of all kinds has greatly improved. I believe that if every society were to keep a wide-a-wake committee on the job, who would check up all reports in reference to dentistry and would furnish the local papers with real news articles, correct and interesting, we would

shortly have the newspapers educated to the fact that we are worthwhile.

The magazines, both general and special, are great fields for the education of the public. In this country, there are numbers of magazines known as "house organs," which are always glad to receive well written articles that will promote the intelligence and health of their circle of readers, who are usually employes and their families and friends. I believe we have never used our full opportunities in these house organs.

Lectures before schools, clubs, churches and other gatherings are being successfully handled, and could be greatly improved by having a central bureau which would furnish detailed information and slides. Many societies have built up excellent exhibits, and these, with graphic charts and lectures, are a potent source of public education. I am mentioning these various methods of publicity, not because I am calling your attention to new facts, but because I wish to develop a better method of using them than we have had before.

Then we have, as a new means, the radio, which reaches a tremendous number of people when they happen to be listening, and I presume some of them are listening all the time. Talks of ten or fifteen minutes over the radio can be made very interesting and should be a regular part of our program. A difficulty in speaking on the radio, however, is that you cannot get a line on what your audience thinks of your efforts, there being absolutely no way of their expressing their approval of what you are saying. Consequently, all radio talks should be carefully worked out beforehand. It is rather dangerous to attempt an extemporaneous speech in the dark. A number of schools have held essay contests on the "Mouth as a Factor in Health," that have been productive of much interest and of much more thought on the care of the mouth by children than it had been possible to initiate before. These contests should be held under the auspices of the local dental societies in all schools every year, and prizes should be offered by the local dental societies.

The industrial bulletin boards, which are seen and read by millions of employes, offer a tremendous field for dental information. These methods of publicity should all be worked to a much higher degree of usefulness than they have been in the past. In 1922, through the efforts of the Dental Welfare Foundation, an organization which was organized by and functioned with the approval of the National Dental Association, there were mailed to the American people, a total of 6,607,464 ethical messages as to what dentistry stands for in the physical welfare of the people of this country.

If the dentists had appreciated their opportunities, there would have been that many messages mailed each month. Even as it was, the postal department of the United States Government received $66,074.64 in cash for the postal cards used in that campaign. It is hardly reasonable to believe that the postal department was the only beneficiary. Those cards undoubtedly have had a considerable influence on the health of the American people. It is a great pity that this organization, which was able to reach such a tremendous number of people, has not been continued from year to year under the auspicies of this Association.

The campaign of the Dental Welfare Foundation proved beyond the question of a doubt that the dentists of this country and public spirited and that they will respond if they are properly approached, so that with an intensive organization which will meet with their approval there will probably never be any serious lack of funds to carry out the work.

At the meeting of the Michigan State Dental Association in Detroit last spring, an excellent new idea was tried out. This idea was the holding of a dental welfare week, a week in which a most intensive effort would be made, using every means of publicity, even to printing on the paper stoppers of milk bottles. Dental Welfare

Week was a great success; so much so that it should be adopted as a national measure for the spread of oral hygiene among the American people.

If one week were selected in which every dental society in America would join with every other dental society to educate the public on the importance of the mouth as a factor of health, we would be doing our duty in a far better manner than we have done it in the past. In order to present such a week, a most intensive organization, beginning with the oral hygiene section of the American Dental Association and working down to the oral hygiene committee of the smallest society in the smallest town, will be necessary. This organization would necessarily have a central headquarters, which would act as a clearing house for distributing information, slides, posters, printed matter, methods of making exhibits and ideas to be used by local societies. In fact, this central organization would very shortly need state headquarters, with possibly district headquarters as well, so that all the information and material could be used to the greatest advantage. Also, such an organization of hygiene workers would be in position to cooperate with and get the help of state and national boards of health, and all of the great beneficiary organizations such as the Red Cross, Antituberculosis League and the United States Public Health Service. An organization with central headquarters would also be able to solicit funds for carrying out this work in a manner impossible with those who make the effort in a purely local field.

Even if we did not attempt to put on a dental welfare week, the intensive organization of oral hygiene bodies into one great fountain of energy would be the greatest step in advance that we have yet attempted. Let us get together in this matter and make our oral hygiene committees something other than a mere collection of names, and by all means, let us avoid placing chronic obstructions in any department of oral hygiene.

The dental welfare week idea offers a great opportunity.

## Discussion

*Sidney J. Rauh, Cincinnati, Ohio:* A man who came to my office this past year representing a toothbrush concern told me that the United States had imported in 1921, 30,000,000 toothbrushes. There were 10,000,000 toothbrushes manufactured in the United States. These figures, the latest available, are absolutely statistical. So, there were 40,000,000 toothbrushes available in the United States. I should say that a person who uses a toothbrush will buy at least two per year, so there would be 20,000,000 people who own toothbrushes. In other words, we are reaching through all manners of publicity 20,000,000 out of 110,000,000 people.

Now you have a field of 90,000,000 people to reach. When I say that, I do not mean that you have reached the 20,000,000 absolutely. I believe those figures are absolutely correct because they were compiled by business men with the idea of manufacturing and selling toothbrushes, and they don't make many mistakes in that way.

I believe that when it comes to publicity, you must start at the basis that every dentist works in his office and meets a certain number of people each day, and every dentist can put his message over to every person who comes in his office. That is the first publicity that I would advocate. It is the publicity of telling them what a clean mouth is, the publicity of telling them what foods they should eat, the publicity of telling them what proper living is, and this man or woman who works in these offices, silently putting in restorations or what not, and does not impress the mind of his patient I think is only doing a part of his work and probably not the most important part of his work, for, if you do not influence your patients, then you certainly will do work that does not hold up as it should, because, as we know, all restorations of any kind do not give their best service unless they are clean.

So my first point is: Put the idea over in your office, and you will find that, as you start to do this, it will grow and grow and grow.

Then you have another influence through this: Suppose your patient is a nurse. She carries the message out. A physician certainly will carry the message. And that is the thing that anybody can do, whether an expert in publicity or not, and of course we do it more or less, but let's do it more.

Last year, I talked before the Toledo Dental Society on this subject and they had done work in Toledo, and very excellent work, but

they wanted to grow, so they thought they would like a little outside enthusiasm and asked if I would come up to see if we could arouse them a bit. They had a very excellent meeting with perhaps fifty men in attendance, which is a good ordinary attendance for that society, and when they were through, they said they couldn't get the publicity. They said that that was their trouble. I said, "Have you a publicity committee?" Yes, they had a publicity committee.

"Who are they?" I didn't know these men and I could say these things. They didn't know who this publicity committee was.

"How do you expect to get publicity if there is nobody to give it? Let's get a publicity committee."

They appointed a committee that night. We went from the meeting to the morning newspaper, a little before midnight. We were fortunate because one of the dentists happened to know the assistant editor. He gave us an excellent reception. We all talked, we all interrupted one another, we didn't know what we wanted ourselves. The next morning when I got up and bought a newspaper, I was astounded to find in the first column, the first page, the leading article, a description of our meeting and what we were attempting to do. And they never could get any publicity in Toledo. And the following Sunday, they had a full page with large pictures, and the editor said, "We will take any of this that you can give us."

Whose fault was it? It wasn't the newspaper's. It was the society's. It was a lack of punch. So, there is a way of getting publicity, and the only way I believe, in the case of newspapers, is to give them what they choose to call "a story."

I have been particularly interested in exhibits for twenty years, and we have an exhibit here, on which I would like to talk for a few minutes.

We have tried to get away to a large extent from this pamphlet style of exhibit. Everybody is using this. I have stood out there by the hour and watched the people go through the hall, and they pass by. They don't read these things and I will venture to say that if I passed this picture around there would not be one person who would read every word that is on it. And this has few words compared to what is in there. Therefore, you must put something in your exhibit, something that is going to attract the eye and the attention of the individual.

We have chosen to do that with models and striking pictures, a picture of pyorrhea and experimental pictures. We colored them, made them striking and labeled them. Some of the work was done by one of the local dentists in Cincinnati to show what focal infection is. They are from postmortems. What is a focal infection? Every dentist is using that term, every physician. There is a picture showing a case of focal infection. Of course, one must have the roentgen-ray to go with that. Another view demonstrated pyorrhea. It needed no amplification, and if it had been four times as large it probably would have been four times as efficacious.

Now the one point in connection with exhibits that I especially want to make is that no matter how good your exhibit is, it is only serving a small part of its purpose unless you put life in it. What is life in the exhibit? Children doing a toothbrush drill. Dentists answering questions regarding focal infection. You must not only have this picture but you must have a man to explain it, and he must have life in him. Electric signs, moving pictures, nurses, nurses in white costumes, those are life.

Supposing a person comes in to look at your exhibit. You don't wait for him to ask you a question. You go up to him and say, "Are you interested in this? What are you particularly interested in?"

"I'd like to know what focal infection is."

You start to explain, and I will guarantee you that inside of two minutes you will have twenty, thirty, fifty or one hundred people around you listening to what you have to say.

If I had the time I would like to demonstrate this to you, whether it be a group of dentists or laymen. If you will go to any of these health shows you will find it to be true.

In connection with our exhibit at the health show in Cincinnati several years ago, we tried to demonstrate that. We took free roentgenograms. We had contests, such as this: The best set of teeth in a child under 3 years of age; the best set of teeth from 3 to 6; the best set of teeth in a person over 80. We had about eight prizes and every person called for his prize at the end of the week. The first person examined by roentgen-ray was the mayor of the city. We saw that he was there to be examined. I doubt if some of our citizens in Cincinnati even knew that. That was good for publicity in the next morning's papers.

Then there are electric signs. There are a number of fine signs available now, and they are of value. They must be used with discretion: they must not go fast, and they only have a certain value.

We have here a pamphlet that we have used in Cincinnati several times and we try to make it very striking. You can see the black and white. We worked on this for a long time. Of course, if we were doing this thing now we could improve on it, but I believe that few words, tritely expressed is the solution of the pamphlet problem. If you put

too much instruction in there, it will not be read by the average man.

It is in the larger centers that the contact with other social agencies is vital, such as Dr. McGee mentioned in his paper—Anti-Tuberculosis League, Public Health Association, the United States Public Health Association, the state, the city health associations. In proportion, as you reach these people is your message carried out for you.

Some of the best work that has been done in Cincinnati in the schools has been done by an antituberculosis league nurse. As you develop your general organization in dentistry you will come in contact with other organizations, and in a town like ours we are always called on in all health movements. We have been working for fifteen years and are an established part of the health movement. So do not expect that if you are starting a new movement you can immediately get the effect which you would like to have. It is going to take work to do it.

Dr. McGee mentions a welfare week. It is a very difficult problem to discuss that point. We held dental educational weeks in our town on several occasions. The value of these will be just as much as the energy you put into them, and especially in the follow up. The dental educational week or day will be of small value unless you follow it up day in and day out, and year in and year out. It is a fine thing to arouse people. It will probably be of more benefit in the beginning to the dentist than it will be to the layman, and for that reason it is certainly worthwhile; but do not be disappointed if you have such a week and nothing comes of it, unless you follow it up all the time. The work entailed in such a week, especially in large towns, is tremendous. In our own week, which was held some years ago, we had a committee to teach the dentists how to deliver talks. That in itself was a big work, but it had this effect that today in Cincinnati we have quite a number of dentists who are capable of going out and delivering talks to various organizations and in the schools, and it has been a vast benefit in that way.

There is one more point that I want to make and that is this: A number of men have been working in this movement for years. We are called on to write articles and to make trips, and I believe that if some system of paying these men, at least something, could be worked out the work would improve. They are constantly calling on us for articles. Why shouldn't a man who has specialized in this type of work be paid for his services just the same as he is paid for magazine articles? The talks are just as difficult to write. They require just as much knowledge, and we are called on day in and day out. Comparatively few men can do it.

*Dr. McGee (closing):* Dr. Rauh's experience in Toledo in getting publicity in the newspaper, proves again that the preparation of news for any journal, whether it is a newspaper or a magazine, comes under the same principle as the preparation of raw material for any other use. You can't use your filling materials, for instance, unless they are properly prepared. It might be the best original substance in the world, but unless it is prepared for your particular use, it has no value.

Now, all that a newspaper does is to sell itself to its readers. They have two objects in view: One is to get new readers, and the other is to hold the old ones. When a matter occurs that you consider of news value, and newspapers refuse to print it, the reason is that from a news standpoint the material you are offering does not sell itself. The thing that they want is the thing that the casual reader will absorb the quickest. There might be a great scientific discovery made, a wonderful thing whose comprehension would demand deep thought and insight; it might be revolutionary, but a newspaper won't print it. What they want is something that the average reader can look over and speculate on without any considerable thought; so you have to predigest all of your information to make it readable; and by having your local committees become familiar with the type of material that is used in your district, which, you can depend on, is what the average intelligence of your district demands, you will know just about what type of material will reach this particular person and how it should be constructed.

When I was a newspaper reporter, the first thing I learned in the office was that there was an invisible man right in front of my desk to whom I wrote my stories and he was "John, the blacksmith" who had graduated from the sixth grade in the public schools and any word used that would not be understood by a student of the sixth grade of the public schools was too complex for that newspaper. That newspaper had the widest circulation in its community because it wrote down to the reading public. The average intelligence in America, while it is much higher than anywhere else, is not very high after all. If your stories are put in good language and in simple language, you will find that all classes of readers will take to them, but if they are at all ambiguous or technical, or if in 300 words more than two words must be looked up in a dictionary, your stories are dead ones. I would strongly advise not only that your local publicity committee be appointed but also that they actually make a study of all the periodicals in your district.

# PRELIMINARY REPORT OF SOME EXPERIMENTS ON THE DESTRUCTION OF HUMAN TOOTH ENAMEL

By THOMAS B. HARTZELL, M.D., D.M.D., F.A.C.D., and WINFORD P. LARSON, Minneapolis, Minnesota

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

THE chemical and parasitic theory of the destruction of enamel was originated by Miller, whose work was published in 1890. Miller spent much time and effort to demonstrate that the destruction of enamel is brought about through the action of lactic acid produced by fermentation of carbohydrates. He deals comprehensively with this idea on pages 105 to 110 in his treatise "The Micro-Organisms of the Human Mouth, and the Local and General Diseases Which Are Caused by Them." Since Miller's work, comparatively little has been done to modify his teachings.

More recently articles bearing on the subject have been contributed by McIntosh, James and Lazarus-Barlow[1] and Rodriquez.[2] The recent work of McIntosh and Rodriquez indicates that acid is the agent active in producing destruction of enamel.

In the work on this subject, the general opinion of all authors for the most part agrees that the destruction of enamel and dentin is caused by the action of acids only.

McIntosh finds an average acid concentration of *p*H 2.75 in nine strains, and Rodriquez finds that the bacteria with which he has experimented has an optimum hydrogen-ion concentration varying from a *p*H of 3.9 to one of 3.6.

We are keenly interested in learning the true etiology of dental caries. We are all agreed that dental caries is the result of bacterial action, particularly those of us who have worked long in the field of prophylaxis. Those of long experience who have devoted themselves to this phase of dentistry, especially those who utilize disclosing stain to reveal, macroscopically, bacterial masses on teeth, will all assent to the view that destruction of enamel depends on bacterial action, because we have proved to our own satisfaction that when teeth can be kept moderately free from bacterial masses, no physical change occurs in the enamel or the gingival tissues, save the normal changes wrought by age. We have all noted the white opacities that occur in the enamel surface of teeth that constantly bear heavy masses of bacteria, and we believe that the prophylacticians will unanimously support the view that when such opacities are polished off, and the injured area is, in the future, maintained bacteria free, further destruction of enamel will not occur. This at least has been our observation. We, therefore, fully concur in the belief that the destruction of enamel and dentin depends on

1. McIntosh, J.; James, W. W., and Lazarus, Barlow, P.: Brit. J. Exper. Path. 3:138 (June) 1922; abstr. Lancet 1:1183 (June 17) 1922.

2. Rodriquez: Mil. Dent. J., 1922.

bacterial action. That it is due to the action of acid waste material of bacteria only we do not believe, for the following reasons: 1. We have submerged teeth for a period of four months in a 0.3 per cent solution of lactic acid with comparatively little destruction, the enamel on the surface becoming faintly opaque. A 0.3 per cent solution of lactic acid is equivalent to a *p*H of 2, or about 100 times stronger in its power of attack or its hydrogen-ion concentration than a *p*H of 3.6. 2. With the equivalent of *p*H 3.6, which is the strongest degree observed by Rodriguez, or better still, or tasting a solution of lactic acid equivalent to a *p*H of 2.75, which is about the acidity of the stomach and the strength reported by McIntosh, James and Barlow, one will note particularly the distinct acid taste. With a 0.3 per cent solution of lactic acid in the mouth or a 0.15 per cent solution of hydrochloric acid, one can note the powerful attack on the tissues. The concentration of these substances has never been reported clinically. There is to be considered also that the normal individual can produce, during the twenty-four hours, from 2 to 2.25 liters of saliva, which at certain periods is distinctly alkaline, tending to neutralize bacterial acids, thus reducing the H-ion concentration to a still lower power of attack by its alkalinity (2 grains of sodium bicarbonate to the liter) and volume, and also by food and water ingested. Further, the buccal surfaces of the lower molars at the gingival line and the distobuccal surfaces of the upper molars at the gingival line become the site of thousands of cavities. Such cavities are prefigured always by masses of bacteria under which is a white opacity in the enamel induced by its disintegration; and Stenson's duct pours in this area of the mouth an intermittent though almost constant flow of saliva tending constantly to neutralize and dilute the acids produced by bacteria to a *p*H which in experimental solutions are incapable of attacking enamel. What then is the explanation of the opacities of enamel produced and seen constantly on the sites where bacteria grow in greatest profusion? One of us (T. B. H.) has kept teeth in a one tenthousandth per cent solution of lactic acid for a year without detecting any visible change, either to the eye or by cutting instruments in the enamel coat. Should we not, therefore, study the ferments produced by bacteria rather than their acid waste product only, in an effort to explain the initiation of the destruction of enamel? Is it not more reasonable to believe that this great outstanding characteristic of bacterial life, its power to digest or disintegrate matter by ferments, is the essential factor in the breaking down of enamel rather than the action of its waste product? It must be kept in mind that experiments with both lactic and hydrochloric acid to decalcify enamel necessitates concentrations we cannot believe occur in the mouth. We are all familiar with the fact that the attacking power of ferments seems to bear almost no relation to their concentration.

Before the days of the junket tablet, the customary way of making sweet clabbered milk was to suspend in the milk to be clabbered a small square of rennet (a piece of calf's stomach wall) and this could be used over and over again, showing that the bulk of rennin needed to coagulate a large amount of milk is infinitely small. In fact, Publow and Van Slyke say one part of pure rennin enzyme will coagulate 3,000,000 parts of milk.[3]

The phrase "moldy teeth" was originated (by T. B. H.) to convey to the lay mind the idea that teeth may be covered with destructive bacteria, even

3. Publow and Van Slyke: Science of Cheese Making.

though all bacteria are not molds. To the end that we might learn something of the effect of ferments rather than make a study of bacterial waste products, we placed a series of teeth in the following mold cultures, April 27, 1923. The teeth in this series were removed August 14, 1923. The molds employed were: (1) *Actinomyces gypsoides;* (2) soil actinomyces; (3) *Rhizopus;* (4) *Botrytis;* (5) *Oidium lactis,* and (6) *Aspergillus niger.*

These molds are of common occurrence, *Aspergillus* and *Oidium lactis* particularly. *Aspergillus* is the mold that so commonly attacks bread. Some of these molds frequently occur in foods. Of the teeth submerged in the series no change was observed except in the cultures of *Aspergillus,* in which the enamel had become opaque, white and brittle, and could be easily cut, macroscopically presenting in every way the physical appearance of the white spots seen where masses of bacteria grow on teeth in the mouth. As the experiment is still under way and the first observation was made only August 14, no microscopic sections have been made. The importance of the observation that *Aspergillus* planted in normal broth, containing no sugar or carbohydrate and incapable of producing acid in such a medium, produced a ferment which attacked human tooth enamel, causing through the medium of a ferment the white opacity and fragility induced by acids, certainly offers food for thought and further experiment to the research workers in this field. It is not maintained that *Aspergillus* is a common inhabitant of the mouth. It is maintained, however, that enamel can be destroyed by substances other than acids and that this substance is a bacterial ferment in an approximate neutral medium with a *p*H of 7.5. If *Aspergillus* can supply a ferment which will destroy enamel, may it not be and is it not entirely possible, that the common bacteria of the mouth also produce ferments which break down enamel prisms? Indeed, it is not impossible that the ferment destroys the intercementing substance of the enamel rod and makes possible the entrance of bacteria into the tooth substance. Since the acid and alkali ions are infinitely smaller than a carbohydrate molecule, it is unreasonable to assume that the latter could pass through bacterial plaques while the former are impermeable to the plaque and are kept from neutralizing each other.

Let us remember, too, that in producing experimental caries in vitro, we are not justified in concluding that the process is exactly the same in the mouth. All bacteriologists know that anthrax in the blood of the living animal is a deadly germ. All bacteriologists also know that the substances produced by the anthrax grown in vitro are not deadly, that the product of anthrax to destroy life must be produced in the body itself. Therefore, we are not justified in concluding that acid decay of teeth produced in vitro does finally settle the question of the etiology of tooth decay in vivo.

During the past twelve months, we have kept human teeth in solutions of hydrochloric and lactic acid in strengths varying from their commercial concentration to one in 10,000. Neither of them seem to attack in solutions equaling *p*H of 2.5. One of us (T. B. H.) has also placed a series of teeth in sodium hydrate varying from the full laboratory strength to one in 10,000, and we note that certain concentrations of sodium hydrate will also disintegrate human tooth enamel, causing it to become opaque, white and friable. Let us, therefore, carry our investigation further.

Bunzell has recently studied the reaction of a comparatively large series of specimens of saliva, in which he found considerable variation.

We are inclined to the belief that the slight acidity reported by Bunzell may be

due to the well-known fact that exposed watery solutions become acid by the absorption of carbon dioxid; for instance, distilled water exposed to the air. We are inclined to the belief that the bacterial ferment is the important thing in the initiation of the breaking down of enamel surface. If this is true, materials used on the enamel surface, which will not harm it, but which will deter the creation of ferments will be useful in preventing enamel destruction, and the work of the prophylactician of the future will take this fact into consideration.

## Discussion

*Theodore B. Beust, Louisville, Ky.:* I do not believe that Dr. Hartzell is on the wrong track, but am surprised that he has attached so much importance to the presence of the bacterial film, which is a revival of the old plaque theory. If we consider the ferments of etiologic importance, we will have to assume the presence of organic tissue in the enamel. Ferments cannot attack inorganic matter without the support of an acid. The comparison made to the markings caused on polished marble by plant rootlets appears to indicate the presence of carbon trioxid. The presence of carbon dioxid in the mouth may have something to do with the problem.

The theory that the ferments may be the initial cause of decay has been advanced several times. I once wrote an article on that subject myself. There is one other point that I might mention. Lactic acid is necessarily a product of metabolism, more so of course in the acidophil groups. But it is nevertheless a constant accompaniment, even in the case of *Aspergillis niger* metabolism. If special means for the elimination of all substances entering into the formation of lactic acid are not taken, our laboratory mediums, even if considered pure, will permit of the development of appreciable amounts. The amount of the acid present in caries would appear to be of little consequence if the time that the tooth is exposed to its action is considered. I am surprised that Dr. Hartzell noticed no decalcification from 3 per cent lactic acid. I have decalcified enamel using 5 per cent and thought that 3 per cent would have the same effect.

*U. G. Rickert, Ann Arbor, Mich.:* Dr. Hartzell is in accord with what I have been saying for some few years, that the breaking down of the tooth does not necessarily depend on the formation of acids. There are other things. My paper called attention to at least initial changes that take place in neutral solutions. I think it is fitting and not heresy to look to some other sources for the explanation of tooth destruction and not to be satisfied with the theory that it is always due to acids. There are certain factors that cannot always be explained if we make that assumption.

*V. A. Latham, Chicago, Ill.:* I can't quite see how we can accept only one side of the question. You can hardly discuss bacteria without the chemical inaction of ferments and their relationship. You have your by-products and again there are other factors. There is the question of the action of gylcerin. I think some of our microscopists should study the higher refractive mediums. We need to work along the line of oxidation reduction and the action of phenol. Then you could go further into the benzol group. It is a combined biologic product you have to work with, the enzyme toxins, ferment and bacteria. Protoplasm has developed in a greater measure than we know. This subject would really have to be worked out under certain groupings. How are we to determine the normality of teeth? Nearly everything today is abnormal.

*Thomas B. Hartzell:* This paper is intended to raise the question as to whether or not it would be worth while to study ferments rather than waste products. I certainly appreciate the point of view of Dr. Rickert and also that of Dr. Latham. I have brought these observations to you with the idea of presenting the question of the initial processes of tooth decay. I have observed hundreds of these small white opacities on teeth. I well remember when I first saw them how they puzzled me and I am going to recall a clinical experience which has always kept me doubtful as to the belief that tooth enamel is broken down only by acids in the mouth. Fifteen years ago a patient consulted me in regard to six teeth showing white decay. Each one of these teeth showed opacities which were brittle and easily rubbed out. I noticed these opacities penetrated the enamel only about one-third the depth and I said to the patient, "I believe that if these opacities are polished out you will keep your teeth for a long time if you will use your tooth brush conscientiously, and prevent bacteria from growing in these areas. I polished out the six white opacities. The patient is still in my care and there has not been further disintegration of the enamel. This planted a reasonable faith in my mind that has subsequently been confirmed by hundreds of such experiments. Thorough cleansing of teeth, made a habit, breaks up bacterial masses which form on the teeth daily. These clinical facts have always

kept in my mind a doubt of the purely acid disintegration of teeth. I think it may be possible that bacterial ferments open the door to the acid-forming bacteria. I cannot decalcify teeth in weak solutions, and when you take into consideration the dilution of a bacterially produced acid and attempt to decalcify teeth and fail, it certainly places a reasonable doubt in your mind as to whether the acid produced by bacteria is the sole factor. We all want to get at the truth, and I have merely presented these arguments for your consideration. In this instance, *Aspergillus niger* in a *p*H 7.5 produced on the surface of the enamel of that tooth an opacity that was very brittle and easily rubbed out. I think it is worth following up, and I hope that some of you will join me in following this subject further.

Certainly when you take into consideration the fact that the rennin enzyme, one part to each 3,000,000 parts of milk, will coagulate milk, you feel that the ferments have a power vastly out of proportion to their bulk. It is in situations where the bacterial growth is very heavy that these opacities occur, and it certainly sets you thinking. That's all I can say. I may be on the wrong track but I hope it will lead to something that will help us a little.

*V. A. Latham, Chicago, Ill.:* Have you tried the effect of enzyme on calcium products? Some say lime is attacked at once by glycerin, others say it is not. I would be very much interested if anyone here can answer the question as to whether glycerin can attack lime. Another point: Just recently, since the war, glass won't hold up at all. You know we cannot find microscopic glass that will hold up against acid. Acid eats the glass and eats your specimen.

*Thomas B. Hartzell:* I can't answer your question, but we had six varieties of molds all growing in the same normal broth and only one broke down enamel, and that happened to be *Aspergillus niger,* the mold of bread.

*Weston A. Price, Cleveland, Ohio:* Since *Aspergillus niger* grows so much faster in *p*H 7.6 than *p*H 7.4, is it not an important factor that caries is developed in the mouth? We practically never find caries in the mouth with *p*H 7.4 of saliva.

*Thomas B. Hartzell:* This is a single observation performed simply to see what would happen, and I am merely reporting what did happen; and I have not tested your observation.

*Russell W. Bunting, Ann Arbor, Mich.:* I refrained from discussing this paper because my mind was much disturbed by the thoughts which were started by it. It has brought to me the reasonable doubt that Dr. Rickert and I have had as to whether acids were really responsible for all caries disintegration. It is often hard to explain how these teeth have broken down under the action of the acids. I was especially interested in what Dr. Hartzell said regarding those cases in which he has succeeded in stopping disintegration by keeping those teeth clean. That emphasizes the importance of prophylaxis. A group of organisms may be demonstrated on the surfaces of the teeth which are carious, and formerly we thought their action due to acid. I am wondering if Dr. Hartzell has tried the plan I tried last winter. I applied some of the indicator dyes to cavities in teeth in the mouth. The saliva, of course, is nearly neutral. In cervical cavities methyl red and bromothymol blue gave an alkaline reaction. In the deeper cavities, the dyes invariably showed acid reaction in the deeper portions. This test was made in the mouth cavity. Of course in the cervical caries there is the bare possibility that there was a very thin mucinous film that kept the dye from getting to the acid but I could find no evidence that there were any acids present.

*Thomas B. Hartzell, (closing):* I am dealing with the very first stages of disintregation of enamel which later on is commonly called caries. If we can get at the initial factor that opens the door to possible disease in the circulatory process, we will have accomplished a great deal, and we will have added one more leader to beat the great problem of dental caries.

# SOME DISEASES OF THE UNDERLYING BONY STRUCTURES OF THE MOUTH

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(Read before the Northern Illinois Dental Society, Freeport, Illinois, October 17, 1923)

IN this paper I shall consider a few of the pathologic changes which take place in the bony structures of the mouth. The two main inflammations which occur in the bone are osteitis and osteomyelitis—osteitis usually referring to inflammation of the dense bone, and osteomyelitis to inflammation of the cancellous bone. Closely associated with osteitis is periostitis—inflammation of the periosteum, which is in immediate contact with the dense cortical layer of the bone. The pericemental membrane of the tooth is closely associated with the periosteum, which covers the cortical layer of dense bone lining the tooth socket, and, as a result, pericementitis and periostitis in this region are practically synonymous terms.

The three main conditions in bone resulting from inflammation are caries, necrosis and sclerosis. Caries is a slow, progressive disintegration of bone tissue, and may be compared to ulceration of soft tissue; necrosis is death *en masse* of a macroscopic area of bone tissue, usually through interference with its blood supply, and sclerosis is a hardening of the bone through excessive calcification. In the main, necrosis is the result of acute inflammation, either periostitis, osteitis or osteomyelitis; caries is the result of subacute inflammation, either periostitis, osteitis or osteomyelitis, and sclerosis the result of chronic inflammation, either periostitis, osteitis or osteomyelitis. I ought to mention here exostosis and excementosis, which are also caused by chronic inflammation.

Some of the underlying causes of necrosis are infections, injuries, phosphorous poisoning, mercury poisoning and syphilis. Acute infections as a cause of necrosis include general osteomyelitis, caused by hematogenous infection during acute fevers, usually in children; acutely abscessed teeth, causing osteomyelitis; acutely abscessed teeth from which the pus strips up the periosteum, thus cutting off the blood supply and infecting at the same time; injection of nonsterile local anesthetic, causing acute infective periostitis; injection of boiling hot anesthetic solution, and acute infection of blood clot in a socket following extraction.

Injuries as a cause of necrosis include injuries during extraction and fractures. The small pieces of process that work through the gums following extraction are small sequestrums as a result of necrosis due to injury. Mercury as a cause of necrosis is usually the result of administering mercury in the treatment of syphilis and is secondary to a mercurial stomatitis. Syphilis as a cause of necrosis usually manifests itself in the tertiary stage and is preceded by the formation of endarteritis and gumma; an acute inflammation results in a disturbance of bloody supply

and a breaking down of tissue. The palate is the usual site to become necrotic in this manner.

Some of the underlying causes of caries are: subacutely abscessed teeth; so-called pyorrhea pockets; perforated roots; perforated floors of pulp chambers; healed over but still infected tooth sockets following extraction; infection of the ends of the fragments following fractures of the bones; local tissue poisoning by the escape of arsenic in treating teeth; subacute periostitis from local infections; subacute inflammation from ill-fitting crowns, bridges and plates (my prosthodontist friends insist on the word denture, but I believe that they will allow me to call anything ill-fitting a plate), and retention of secretions which become infected, especially around the distal of lower third molar crowns.

Some of the underlying causes of sclerosis are: chronic inflammation in the bone surrounding so-called pyorrhea pockets; chronic inflammation around long-standing so-called granulomas, and the irritation of healed-over so-called granulomas which have not been curetted at the time of the extraction.

The main treatment of necrosis is (1) removal of the exciting cause; (2) drainage until separation of the sequestrum and the formation of healthy granulations; (3) cauterization of any exposed bone, and (4) general treatment of the patient, especially diet and the elimination of toxins. In cases in which a very large area of the jaw becomes necrotic, the sequestrums are sometimes left in place even after they are separated from the healthy bone; this is for the purpose of maintaining the contour of the jaw until regeneration of bone takes place.

The main treatment of caries is (1) removal of the exciting cause; (2) curettement of involved bone, if necessary; (3) drainage plus antiseptic irrigation until the formation of healthy granulations; (4) topical application of sedatives if necessary, and (5) general treatment.

The removal of the exciting cause in pyorrhea must include the cutting away of the gum tissue overlying deep pockets, and I should mention here that pockets are never so deep as the roentgen ray indicates, for the bone destruction is what is revealed and the irritation always causes bone destruction deeper than the actual pyorrhea pocket. This bone will regenerate to the depth of the pocket, on removal of the irritation.

The removal of the exciting cause in so-called granulomas or subacutely or chronically abscessed teeth means treatment until the rarefied area completely disappears on roentgen-ray examination; extraction, which is the usual procedure; or root resection, which will only be called successful when the bone fills in completely around the remaining part of the root. As to whether at the time of extraction the so-called granuloma should be curetted, we feel that Nature may be allowed to take care of small areas in a healthy patient, but that all larger ones should be completely removed at the time of extraction, because Nature does not always take care of them—many of them heal over, enlarge, and are a continuing menace to the health of the patient. While speaking of chronically abscessed teeth, I must impress on you the danger of taking out several such teeth at one time. Serious enough reactions may occur in a healthy patient, and using such poor judgment on a sick patient is dangerous and almost criminal. In curetting a granuloma in the mandible, care should be taken not to injure the inferior dental nerve, and in curetting a granuloma in the bicuspid or molar region of the maxilla, care should be taken to peel an extensive one from the antrum floor without injuring or puncturing this membrane; such a procedure will avoid subsequent antrum infection. In any removal of necrotic or carious bone, the periosteum should be preserved wherever

possible to help the regeneration of new bone.

When the roentgen ray shows bone absorption around the apex of a tooth with a live pulp caused by a carious condition at the apex of an adjoining tooth, this latter tooth should be extracted without curettement or with the curetting limited to the region of its apex. Roentgen-ray check-up a few months later will usually show the bone fully regenerated around the apex of the tooth with the live pulp.

In the treatment of a painful socket following extraction, I first clean out all infected blood clots; then I dry the socket thoroughly, and finally, I put in a lightly packed dressing of iodoform gauze saturated with some obtundent. Such treatment ought to relieve the patient of pain almost completely in five minutes.

The main treatment of sclerosis is the removal of the exciting cause. Any other interference or removal of the sclerotic bone is, so far as I know, unnecessary, unless it appears to be the cause of a neuralgia by impingement on nerve tissue.

### Cysts

The usual cysts found in the jaws are simple cyst, dentigerous cyst, multilocular cyst, and cystic degeneration of a chronic alveolar abscess.

A cyst is a sac filled with fluid and lined with either an epithelial or an endothelial membrane; in the jaws it is usually an epithelial lining. They may become infected and are then filled with pus. Although they may degenerate into malignancy, they are usually benign and vary in size from microscopic to enormous proportions. Cysts grow very slowly, and the pressure of the secreted fluid causes the bone to be absorbed around them and often forces to one side structures that it does not absorb, such as teeth, the inferior dental nerve, and the antrum lining. Their origin is from nests of epithelial cells left in the bone during tooth development, and in the case of the dentigerous cyst, which contains a tooth or many denticles, the membrane develops from the epithelium surrounding the crown. The diagnosis of cyst is confirmed by roentgen-ray examination, and the treatment is essentially removing every particle of the lining membrane, and keeping the cavity lightly packed with iodoform gauze until it is entirely filled in by granulations The incision should be not on the top of the ridge but to one side, usually the buccal, so that the natural contour of the ridge is preserved for prosthesis. Teeth should not be extracted until after the membrane is removed, as the cyst may be found to be on the lingual of the roots of teeth which the roentgen ray apparently shows to be involved. If a cyst involves practically the whole thickness of the mandible with consequent danger of fracture in removal, the cyst should be drained for several months to allow some bone to regenerate, thus strengthening the jaw; then the entire cyst may be removed with no possibility of fracture. In peeling out a cyst membrane which lies contiguous to the inferior dental nerve, one must be sure to preserve the nerve, avoiding injury to it and thus obviating any prolonged anesthesia of the mandible anterior to this area and of the lower lip on that side. A cyst that has destroyed the bone of the maxilla as far as the antrum should be peeled away from the antrum membrane without puncturing it. If this is done, we need have no fear of antrum involvement following the operation.

### Carcinoma

Carcinoma is an epithelial malignant tumor usually occurring late in life. Two forms are recognized: the peripheral, starting in the overlying soft tissues and gradually involving the bone, and the central, developing from developmental

epithelial débris in the bone itself. Before attaining a very great size, carcinomas usually break down, a very disagreeable but characteristic odor resulting. Unless the condition is recognized very early, the treatment necessary must be very radical, if the patient's life is to be saved, and that means that usually the whole maxilla or half of the mandible must be sacrificed, as well as the lymphatic glands of the neck on the involved side. The duty of the dentist to his patients is plainly manifest—he should examine the entire surface of every mouth to the end that every suspicious growth be recognized in its incipiency.

### Sarcoma

Sarcoma is a connective-tissue malignant tumor usually occurring early in life, and most often beginning in the periosteum. The small round cell and the large spindle cell types are the most malignant. A large proportion is giant-celled and not so malignant. The former must receive very radical treatment, but the latter is often cured by including a very small border of normal tissue within the incision. In the latter type, if found in the mandible, I always try to prevent deformity by leaving the lower border of the bone, if this part is not involved. In the maxilla, sarcomas seem to have a predilection for the spheno-maxillary fossa, and even though it is very extensive, the patient may often be permanently cured by removal of all apparently involved tissue. An epulis may degenerate into sarcoma and thereby involve a considerable bone area, and so, in removing any epulis, the underlying bone should be thoroughly curetted. Sarcoma, also, brings to our attention the fact that the dentist who has the best interests of his patient in mind will always be on the watch for suspicious-looking growths.

Ligation of the external carotid artery is demanded by good judgment whenever any extensive surgical removal of carcinoma or sarcoma is necessary. All tumors should be removed intraorally if possible, and deformity is often prevented by prosthesis immediately following operation.

### Osteoma

Osteoma is a progressively enlarging benign tumor of hard bone tissue. It may involve the central spongy bone of the jaws, or it may grow on the surface cortical layer. It is often found in the median line of the palate and on the lingual surface of the mandible opposite the bicuspid region, and in this latter location it is often bilateral. Unless large enough to be of mechanical annoyance, or unless causing pain, it need not be removed.

### Fractures

We all know the symptoms found in fracture of the jaw, and with the roentgen ray now in common use there need be no excuse for slipping up on the diagnosis of a fracture. In treating a fracture, the main principles to be followed are to replace the fragments in their normal or best position, to immobilize them, and to watch for and take care of any infection that may result from the fracture. I said to replace the fragments in the best relationship; by this I mean that the mandible or maxilla may have had very poor occlusion, and if accidentally fractured, this occlusion may be greatly benefited by placing the fragments in a position other than their previous position. Loose teeth, if healthy, practically always should be retained. Abscessed teeth should practically always be extracted, because infection from such teeth may interfere with union, and cause bone destruction at the ends of the fragments. It is never necessary to extract a tooth in order to feed a patient whose jaws are wired together.

Infection following a fracture of the mandible is treated by making a generous incision to the bone in a line opposite the apices of the teeth in the

region of the line of fracture, and through this incision stripping the periosteum away from the ends of the fragments to the lower border of the bone, and keeping this area packed with iodoform gauze which is changed every second day until the whole area is covered with healthy granulations. The same principle applies to the maxilla. If, without local symptoms of infection, the roentgen ray seems to indicate a carious condition of the ends of the fragments, this appearance may be due to the fragments being incompletely approximated. In the fracture of the maxilla in which the fragment is displaced downward so that the teeth on the opposite side fail to come into occlusion, the teeth of the mandible and maxilla on this side should be wired together and the wires tightened each day, thus forcing the fragment upward until we have functional occlusion.

### Dislocation

In replacing a dislocated mandible, the idea is to bring the condyle downward, backward over the eminentia articularis, and upward into the socket. This may sometimes be done by the pressure of the thumbs on the lower molar teeth, but if this method is used, the thumbs should be amply protected from injury by wrapping a small towel around them. In some difficult cases, a piece of wood is placed between the molar teeth, pressure on the chin upward causes the condyle to move down, and we then with the block of wood rotate the lower teeth backward until the condyle slips into place. It might be mentioned in relation to dislocation that a plaster cast of the head is never necessary to hold the condyle in its normal position.

### Ankylosis

In true bony ankylosis of the temporomandibular articulation, the usual treatment is to resect either the head or the neck of the condyle, or to make an artificial joint in the middle of the ramus of the mandible; such a joint should be crescent-shaped with the convex side up. If an ankylosis of the mandible occurring before the fifteenth year is not corrected, the mandible on that side will not develop normally, but will assume a shape characteristic of ankylosis and leave the patient with a facial deformity.

Impacted teeth, except in rare cases, should be removed or brought into position by orthodontic methods. If left alone, they may cause absorption of the roots and thus loss of adjoining teeth. When the crowns are exposed to the saliva, large infected areas may form around them. They may force all the teeth on that side out of alinement, causing malocclusion with its subsequent sequelae and irregularities of the anterior teeth. They may cause severe neuralgias, headaches or other reflex nerve disturbances, including a general irritability of the entire nervous system. They may cause carcinoma by constant irritation, and they may cause some types of insanity. Considering all these possibilities and knowing how little discomfort is caused by skilful removal, it would seem to be serving the patient best to advise that practically all impacted teeth be either moved into functional occlusion or else removed. It must be mentioned in this connection that most impacted upper cuspids in young people can be moved into place by skilful orthodontic methods.

### Foreign Bodies

Among the foreign bodies often found in the jaws are broaches, broken burs, broken tips of curets and elevators, guttapercha from overfilled canals left in after extraction, hypodermic needles, and amalgam, gold, cement, porcelain and pieces of enamel that have fallen into sockets during extraction and which have healed over. Where the bone has filled in completely around such foreign bodies, they may be left alone without harm to the patient's health. However, they are potential sources of reinfection

and it would be conducive to a better state of mind of both operator and patient if they were removed.

The importance of complete roentgen-ray examination of all mouths must be stressed, and this must include all areas where teeth have been removed. Even though teeth appear perfect, it is surprising what conditions will show up under roentgen-ray examinations. In apparently healthy edentulous mouths, Gardner of the Mayo Clinic reports over 30 per cent showing root tips, infection, etc. I should like to impress on you the importance of learning how to interpret correctly roentgen-ray pictures of the jaws. The roentgen ray never lies—in cases where the roentgen ray is thus accused we find the operator reading into it something that "isn't" or missing something that "is." There are dozens of normal dark areas showing up in pictures, and these must not be confused with pathologic changes. One other thing must be stressed: many films have inherent imperfections, and the experienced operator is always on the lookout for them, for they may simulate various abnormal conditions and might easily lead to unnecessary operations.

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## DIET AND TEETH

ONLY a few years ago, the problem of carious or defective teeth was looked on as one primarily of concern to the dentist. The damage to the dental structures seemed to be so obviously local in many cases that the specialist's eyes and only his were focused on them. There is an increasing realization today, however, that the condition of all bony structures in the body may be profoundly involved by the nutrition of the organism during the period, at any rate, of most active growth and bodily development. This situation in current knowledge has been developed in no small measure as the result of the recent studies of certain deficiency diseases, notably scurvy and rickets. The changing views and the contrasting schools of thought are discernible in present-day discussions of dental problems. One group emphasizes oral prophylaxis with a vigor that implies bacterial invasion of the teeth to be the foremost factor in the preservation of these structures; whereas other students of the subject are inclined to seek more far-reaching etiologic possibilities, among which dietary disturbances loom largest in their eyes. It requires little critical acumen to note that the two general possibilities do not represent conflicting factors. Inadequate or incorrect nutrition may open the way for microbiotic changes that are ordinarily resisted by a tissue that is in perfect health and thus endowed with a normal modicum of the factors of safety and resistance. Infection and immunity are antagonistic tendencies remaining in beneficent equilibrium when "all is well" in the body.

There is widespread acceptance of a sort of "all or none" principle in many branches of physiology. Perhaps the idea has been given an application that is too broad by its advocates. We are wont to believe, with considerable justification, that the products of biologic synthesis tend to be normal in their makeup, else they are not formed. The

saliva always approximates the same fundamental composition, though the amount formed may vary widely. Milk, is, in general, the same from day to day in the same species. There may be a larger or smaller volume, and the content of fat may vary slightly; but the mammary product always contains essentially the same proportions of certain highly characteristic organic and inorganic nutrients. Hence the familiar dictum that the quality of the milk is for the most part determined by breed rather than feed.

Can a tooth once formed be changed by diet? The question is obviously not strictly analogous to that presented by the secretions synthesized in the body. If the teeth represent living changeable parts of the body as other organs do, one might expect chemical changes in them to attend profound disturbances. The development of unusual conditions in the teeth under conditions of dietary upset has been reported by a number of histologists, notably in the case of the teeth of scorbutic animals. Toverud (The Influence of Diet on Teeth and Bones, J. Biol. Chem. 58: 583 [Dec.] 1923) has extended these studies recently by making analyses of the histologically altered structures, which show that the chemical picture also may be altered. In scorbutic animals, for example, a marked decrease in total ash and calcium and a marked increase in magnesium have been found. In animals existing on diets poor in calcium, chemical changes have been detected both in the constantly growing front teeth and in the fully formed molar teeth. The chemical process in the two kinds of teeth seems to be a different one. Analyses of the molars show a reduction in the total ash, with a small decrease in the calcium and phosphorus and a small increase in the magnesium content. Analyses of front teeth show a reduction in all respects. These studies of Toverud seem to warrant the assertion that it is possible to produce chemical changes in an already formed tooth by changing the diet. The tooth is evidently no exception among the bony structures. The consideration of dental caries must henceforth take this fact into account.—*Journal of the American Medical Association,* May 17, 1924.

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## *Editorial*

### VACATION TIME

What a stale, stilted and stiffened lot of humanity we would be without an occasional vacation. The complexity and concentration of our modern life, with its ever-increasing tension, entails a strain that must be reckoned with if we are to maintain a balance between supply and demand—supply of energy and demand of nervous force. No man can keep up the pace at which most of us travel in our daily routine without a periodic surcease from it all and a complete forgetfulness. To do otherwise is to break sooner or later. It may truly be said that we are not living a rational or normal kind of life, but how is it to be remedied? Not by one man, or by any particular set of men. It is the tendency of the age to go at full speed, and the individual who does not do this is likely to get run over. We may philosophize all we wish about the folly of rushing along as we do, but no man has the power to stem the tide, and thus the probability is that we shall continue to rush as we have in the past.

This necessitates a systematic provision for such vacations as will enable us to store up energy for this unnatural strain, and so the thing we formerly looked on as a luxury has become an actual necessity.

But it is a very pleasing necessity, and one which we like to contemplate. Who is there among all our business or professional associates that does not look forward, more or less longingly, to the day when he can get out in the open with Nature and tune his ear to the rhythm of good old Mother Earth? A large percentage of our city dwellers of today were born in the country, and the call back to the broad fields, the running brooks and the wooded slopes becomes ever more and more insistent. There is a harshness and hardness about city life which rasps the nerves and wears them out—there is a jostling

and crowding, and clanging and banging in the city that grows irksome after a while.

The walls of bare brick and stone oppose the eye and offend the vision. The merciless sun glares on the cement walks and glances from the plate glass windows. It becomes terribly tiresome after a time—this intensity of the city—and we long for a change. We long for the broad expanse of the blessed country, the wide sweep of the horizon, and the soft rustle of the breeze through the fluttering leaves. What is more delightful than to feel the yielding carpet of green turf under foot, the springiness, the bounding joy with which we leap from one hillock to another. Is there anything more exhilarating? Or to lie lazily beside a babbling brook and watch the myriad lights and shades as the water swirls under a bank or leaps over a rock. We are one with Nature, and reck not of office hours or appointments, or dental meetings or college lectures, or the manifold exactions of our city life. Many of the members of the American Dental Association have had a strenuous and stressful time during the winter just past. Problems have arisen which have demanded of them their most incessant and undivided attention; and it has been a period of uncertainty and anxiety in many important particulars. But now that the clouds have for the most part rolled away, the time is ripe for relaxation, and for the rebuilding of energy, which will be so greatly needed when the Association convenes for its next annual meeting in November. Let us all get away for a brief respite—some one place, some another—to the end that we may return to our labors with renewed energy and a real taste for our allotted work. Here is hoping that every member of the American Dental Association may find that particular kind of vacation most fitted for his needs, and that all may get the greatest possible pleasure out of his recreation.

## THE SEASONS—SUMMER

Summer is the great out-of-door season, when a cooped-up humanity bursts its bonds, and waving the doorway aside, breaks out into the open and breathes freely of the pure air of heaven. Hats are tossed out of sight, sleeves are rolled up, wraps are consigned to the closet, collars are a thing despised, and freedom reigns supreme. Out of the subtle bondage of winter, the body and soul of man emerge to drink in the glories of the sunshine and the stars. In summer, we get closer to Nature—we lay our head on the ample breast of Mother Earth, and listen to the rhythm of the spheres. The hum of insects, the song of

birds, the lowing of kine, the music of the rustling leaves and the merry peal of laughter floating over the lambent air, all speak to us of summer. What is finer than the robin's chirp in the nearby tree, or the call of the whippoorwill down in the swamp? Even the tweet-tweet of the tiny wren brings a joy to the heart. The tinkling of the cow-bell in the pasture lot, the roosters clarion call in early morn, the whinny of the mother mare over her frolicking colt, the bleating of the strayed lamb, and the bawling of the hungry calves under the orchard trees are all redolent of summer. Nature is decked in its finest garb. The vines creep tenderly over the garden wall, and cling to the drooping porch. The sweet peas, the morning glories, the rambler roses and the tiger lilies are all at their best. The landscape smiles with fields of waving grain, and the forest is clothed in a mantle of thickest green. Across the hills and valleys, the sunshine plays with the shadows, and mingles with the pinnacles of the lofty pines. The slopes lie variegated in the noonday sun—the light brown of the already faded grass, the rich yellow of the ripened grain, and the lush green of the growing corn. All the outlines of wood and vale are softened by the different shades of foliage, and the contours are rounded and mellowed by the loving hand of Nature.

Down in the meadow, the purling brook mingles its music with the twitter of the birds, and the murmur of the overhanging boughs. The bending limbs swayed by the playful siren winds are dipping now and then their leaves in the bubbling surface of the stream, and dropping pearls as they rise again. The whole earth is bursting with the bounty of benevolent Nature, yielding in lavish plenty the seeds and fruits and roots and herbs for the sustenance of man and beast. What a loving mother the soil is—and we trample it under foot in utter disregard as if we spurned it. The bulging barns, the surplus stocks, and the crowded cellars all speak of the beneficence of Nature and her laws. What miraculous alchemy is wrought by the cycle of the summer months—transferring the elements of the soil and air and clouds into the morsels that delight and nourish us. Why are we not more grateful? And then summer showers, when the somber sky broods over the thirsty earth and sends the cooling draughts to freshen the fields and flowers and trees and vines, and clears the turgid air. Even the boisterous thunder storms, so terrifying to the timid, and so riotous in some of their moods, doing grievous damage at times and taking titanic toll of spires and lofty peaks—what a wondrous spectacle they present. Such a crashing pealing, monstrous display of energy and uneasiness; such a glorious combat of the angry elements—flash following flash, boom upon boom, and all mingling with the swirling, beating, glancing javelins of rain. There is little else like it in nature, and nothing to approach it in art. It is the one and only, the greatest and most superb show of earth.

Summer is the season of lakes and woods and running brooks. It brings surcease to the strained nerves, and balm to the aching muscles. It takes the tired souls of men, and lulls them to restfulness by the soft sighing of its mysterious moods. It savors of health and happiness, of hope and joy, of freedom and fertility. It is the consummation of all the loves and longings of the spring—the full fruition of Nature's myriad promises. It is a blessing undisguised, and one of humanity's greatest heritages. Let us make the most of summer while its lasts—the days will soon be short, and the clouds will soon be hanging low.

## TRANSPORTATION ARRANGEMENTS

An Identification Certificate will be mailed to each member of the American Dental Association.

These certificates when properly filled out and presented to the local ticket agent, will entitle members to purchase round trip tickets, Dallas and return, for themselves and dependent members of their families at one and one-half fare.

Tickets good going from November 6 to 12, inclusive, with return limit November 20. Pacific Coast points date of sale one day earlier and return one day later.

The round trip fares from the cities shown will be as follows:

| | |
|---|---|
| Boston via Chicago or St. Louis | $ 98.60 |
| New York via Chicago or St. Louis | 87.84 |
| Philadelphia via Chicago or St. Louis | 82.98 |
| Cleveland via Chicago or St. Louis | 64.70 |
| Detroit via Chicago or St. Louis | 62.69 |
| Chicago via St. Louis | 51.54 |
| Minneapolis via Chicago | 67.16 |
| Minneapolis via St. Louis | 56.81 |
| Cincinnati via St. Louis | 52.28 |
| Milwaukee via Chicago | 56.13 |
| St. Paul via Chicago | 67.16 |
| St. Paul via St. Louis | 56.48 |
| Louisville via St. Louis | 45.83 |
| Pittsburgh via Chicago or St. Louis | 69.06 |
| Omaha via Little Rock | 40.71 |
| Kansas City via Little Rock | 29.96 |
| Washington via Chicago | 82.98 |
| Washington via St. Louis | 77.79 |
| Toledo via Chicago or St. Louis | 59.93 |
| Nashville | 38.15 |
| Memphis | 25.28 |
| Portland, Ore. | 119.30 |
| Seattle | 126.39 |
| San Francisco | 99.90 |

Proportionate fares from all other territory; Pullman fares additional.

### Special Train

For the accommodation of members, a special train has been arranged via the Illinois Central, Missouri Pacific and Texas & Pacific.

Passengers from territory tributary to Chicago will arrive in time to leave on special at 3:00 p. m., November 7. Passengers via St. Louis will arrive there in time to leave on special at 10:30 p. m., November 7. The special is scheduled to arrive in Little Rock, Ark., at 8:00 a. m., Saturday, November 8. The day will be divided between Little Rock and Hot Springs, the train leaving that night and arriving in Dallas the following morning. The present plan includes an automobile ride through Little Rock, followed by a 60-mile motor trip through the Ozarks to Hot Springs.

The Hot Springs Business Men's League will have a program of entertainment including a trip about the city and vicinity, complimentary use of the golf course and bath houses, etc.

### Water and Rail Route

From New York to Galveston via Mallory lines, sailings are on Wednesday at noon. The fare including berth and meals is $63. The railroad fare from Galveston to New York via Dallas is $63.77. The trip from New York to Galveston requires six days.

From New York to New Orleans via Southern Pacific lines, sailings are Saturday noon, with arrival in New Orleans the following Friday. The fare from New York to New Orleans including berth and meals is $60. The railroad fare from New Orleans to New York via Dallas is $78.88.

### Old Mexico

The plans for the trip to Mexico City after the Dallas meeting are maturing, and considerable interest is being shown by parties wishing to include this journey in their itinerary.

On account of the six-day return limit on the Identification Certificate tickets, it will be necessary for those going to Mexico City to purchase Winter Tourist tickets. These tickets are in effect from October 1 to April 30, and permit stopover privileges at Dallas or any points enroute.

Following are a few examples of Winter Tourist rates:

| | |
|---|---|
| New York | $176.46 |
| Philadelphia | 170.62 |
| Chicago | 130.10 |
| Kansas City | 104.75 |
| Denver | 118.07 |
| Memphis | 101.35 |

D. C. BACON, Chairman,
Transportation Committee,
31 North State St., Chicago, Ill.

# THE DENTAL WELFARE RELIEF COMMITTEE OF JAPAN

748 Marunouchi Building
Tokyo, Japan
January 18, 1924

Dr. Otto U. King,
5 North Wabash Avenue,
Chicago, Ill., U. S. A.

My Dear Dr. King:

Following your thoughtful suggestions stated in your kind letter under the date of December 2, 1923, several meetings were held for the purpose of selecting a proper committee authorized to receive and distribute funds, instruments, books, etc.

The first meeting was held on January 10. Those present were all representative men of our profession and the proposal herein enclosed was presented by Dr. L. E. Butler and was unanimously adopted. From this document you will notice that the entire matter has been placed in the hands of the Dental Federation of Japan and that the appointment of the said committee has been made.

Accordingly, a special meeting of the Dental Federation of Japan was called and the following committee was selected:

The Japanese section of the committee:

Dr. Morinosuke Chiwaki, president of the Tokyo Dental College and President of the Dental Federation of Japan.

Dr. Daisuke Nomura, vice-president of the Dental Federation of Japan.

Dr. Seiji Muraoka, president of the Dental Society of Tokyo.

Dr. Renosuke Hayano, president of the Dental Society of Yokohama.

Dr. Wataru Kawai, professor in the Dental Department of the Nippon University.

Dr. Seiji Kato, Professor of Nippon Dental College.

The American section of the committee:

Dr. L. E. Butler, practicing American dentist in Tokyo.

Mr. E. W. Frazar of Sale & Frazar & Co.

Hon. Jefferson Caffery, the Charge d' Affaires of the American Embassy at Tokyo.

These above-mentioned men constitute the committee proper and Mr. Kengo Moriya, representative of the L. D. Caulk Co., in Japan, was chosen secretary and interpreter.

Dr. Shirokuro Endo, Professor of Tokyo Dental College was requested to assist us whenever it should be necessary.

The first meeting of the Dental Welfare Relief Committee was held

on January 15, and the following officers were chosen: Dr. Chiwaki, chairman; Dr. L. E. Butler, vice-chairman, who will also act as chairman of the American section of the committee.

It was decided that the headquarters of the Dental Welfare Relief Committee will be at No. 748 Marunouchi Building, Tokyo, Japan, to which place all communications should be addressed.

A copy of this letter has been sent to Dr. C. N. Johnson of Chicago.

Very faithfully yours,

The Dental Welfare Relief Committee

Dr. M. Chiwaki, Chairman.

PROPOSAL

Submitted to the representatives of the dental profession of Japan at a meeting held at Room 749 of the Marunouchi Building on January 10, 1924, at 6:30 p. m.

WHEREAS: Through various sources it has been ascertained that a contribution of dental instruments, supplies and money has been collected in America and is ready to be forwarded to Japan upon advice of the appointment of a proper committee to receive the said contribution.

*Therefore*, It is hereby suggested that the entire matter be placed in the hands of the Dental Federation of Japan and that an appropriate committee be appointed to receive the aforesaid contribution or any other similar contribution from the United States of America, and the status and duties of this committee shall be as follows:

1. This Committee shall be known as "The Dental Welfare Relief Committee of Japan."

2. The committee shall comprise nine members, six of whom are to be Japanese, the three others Americans.

3. The committee shall be known as comprising two sections, viz., the American section and the Japanese section.

4. All meetings of this joint committee shall be presided over by a chairman who shall be selected at the first meeting and who shall remain in office until a successor be selected.

5. The members of this committee shall be selected by their social standing and reputation in the community and profession.

6. No member of the American section of the committee shall be beneficiary financially or otherwise, either directly or indirectly, for himself or any institution.

7. The duties of the American section of this committee will be to act as trustees and shall actually receive the contributions from the American Dental Association or other associations, and each member shall sign all documents appertaining thereto, in the form of receipts, etc.

8. All money received must be deposited in some bank and paid out by checks signed by all three members of the American committee and indorsed by two members of the Japanese section along with the receiver of the check.

9. The duties of the Japanese section of the committee shall be to arrange for the proper landing, transportation and storage of all supplies received from the United States of America.

10. The Japanese section of the committee shall gather and submit all data that may be required by the whole committee at any time.

11. The Japanese section shall decide upon the actual distribution of the contributions and bear the responsibility for the donation being used to the best advantage in the best interest of the dental profession of Japan as it has been affected by the earthquake of September, 1923.

The Japanese section of the committee shall submit a complete report showing the amount of damage suffered by all individuals or institutions associated with the dental profession in the devastated area. (The exact financial condition of such parties prior to September 1 need not be reported on.)

12. The Japanese section of the committee shall collect receipts from the recipients of donations of materials or supplies as the case may be, and shall deliver to the American section of the committee these receipts to be signed by any two members of the Japanaese section together with the signatures of the recipients.

13. All matters pertaining to either section must be presented and approved by the whole

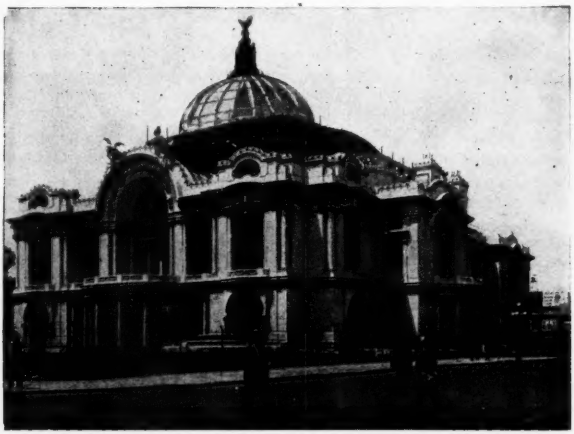
committee, at meetings called for the purpose whenever it may be deemed necessary or advisable to hold such meetings.

14. The American section will notify the authorities of the American Dental Association of the proper distribution of the contribution, and the disbursement of the fund. (The Japanese of the committee or other Japanese representatives of the dental profession of Japan will, of course, acknowledge the receipt of the contributions in a formal manner direct to the proper authorities in the United States of America.

**Voted, that the Secretary be authorized to receive funds for Japanese relief and that all moneys be transmitted direct by him to the Dental Welfare Relief Committee of Japan, and that the President be authorized to appoint local committees in New York and San Francisco to receive and transmit to this committee in Japan, books, instruments and magazines contributed to the Japanese cause.—*Transactions of the Board of Trustees.***

## CHANGE OF ADDRESS

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION is mailed as second-class matter, and like all other printed matter that does not require first class postage, cannot be forwarded from one address to another, free of charge. If you change your address without notifying us, THE JOURNAL will not reach you. Requesting the postmaster to forward your mail will not insure your receiving THE JOURNAL unless you pay him the postage for forwarding it. Should you move from one place to another, be sure to inform us promptly, giving both your old and your new address, and also the date when your subscription expires.



National Theater, Mexico City, built at a cost of 20,000,000 pesos (about $10,000,000).

# Medical and Dental News

## CONNECTICUT

**Juvenile Clinic:** Through the generosity of Mrs. H. H. Jenkins, the Hartley Corporation has placed at the disposal of the juvenile courts, public schools, social agencies and parents of Connecticut a clinic for child study at Hartford. The clinic, which will be known as the Helen Hartley Jenkins Juvenile Clinic, will make a physical, psychologic, psychiatric and social study of each child referred to it, and when needed, will recommend a method of treatment. Dr. Thomas W. Salmon, professor of psychiatry, Columbia University, New York City, will conduct the clinic, and he has appointed Dr. Otto G. Weidman medical director and psychiatrist, and Dr. Harold A. Bancroft assistant psychiatrist.—Journal of the American Medical Association, May 31, 1924.

## GEORGIA

**Educational Movies for Children:** The Atlanta (Ga.) Better Films Committee, which has been putting on special educational films for children at the leading theaters attended by white people, in Atlanta, recently extended the service to one of the theaters attended by colored people. The colored women's clubs of the city are cooperating by providing chaperonage for the children. The Better Films Committee is made up of Atlanta women prominent in club and social life.—Southern Workman, Hampton Institute, Hampton, Va., April, 1924.

## IOWA

**Iowa Wins in Health Educational Work:** For the fifth time in as many years Iowa schools are leaders in health educational work, according to an announcement from the National Tuberculosis Association of New York. In the national interschool contest in the modern health crusade work for the first half of the present year, Iowa won four out of the eleven first prize banners. Two hundred and sixty-eight prize pennants have been awarded to Iowa schools for excellence in practical health work. This is nearly half the total number awarded throughout the country.—Journal of the American Medical Association, May 24, 1924.

## KANSAS

**Prize Awarded for Scientific Paper:** Dr. Russell L. Haden, professor of experimental medicine, University of Kansas School of Medicine, was awarded the J. D. Griffith prize of $100 at the annual smoker of the Kansas City Academy of Medicine, May 16, for his paper on "Ocular Pathology Associated with Dental Infection." Dr. Griffith offers this prize for the best scientific paper read before the academy each year.—Journal of the American Medical Association, May 24, 1924.

## MARYLAND

**Association of Military Dental Surgeons:** A Maryland chapter of the Association of Military Dental Surgeons will be organized, Monday, May 5, at the Southern Hotel, Baltimore.—Bulletin of the Maryland State Dental Association, April, 1924.

## NEW YORK

**Rotary Club Nurse for Crippled Children:** The Boy's Work Committee of the Rotary Club of New York City employs a nurse for physiotherapeutic work among crippled children in its territory. The services of the nurse are available to clinics or hospitals which have orthopedic surgeons on their staffs, with the understanding that any department of physiotherapy organized by the Rotary Club nurse shall be continued by the clinic or hospital on the removal of the nurse to another field of work.—The Crippled Child, Cleveland. March, 1924.

**Chiropractor-Diphtheria-Manslaughter:** A jury in the Brooklyn (N. Y.) Supreme

Court has just found a chiropractor, Ernest G. Meyer, guilty of manslaughter, on account of "culpable negligence" in the treatment of a patient who died from diphtheria. The maximum penalty is imprisonment for from ten to twenty years. The chiropractor, it is stated, did not know his patient had diphtheria. A few verdicts such as this will go a long way toward preventing and curing such negligence. No man is required to treat a patient who is sick or injured. If he does so, however, he must recognize his accountability for his acts. If the would-be chiropractor can be made to understand this, there will probably be fewer adherents to the methods of that cult.—Journal of the American Medical Association.

**Quack Advertising Barred:** At a meeting of the New York City Board of Health, recently, a committee of public spirited citizens was organized to enforce the law against quack advertisements appearing in foreign language newspapers.—Journal of the American Medical Association.

**Dr. Rubin Expelled:** At a regular meeting of the Medical Society of the County of New York, March 24, Dr. Herman H. Rubin was expelled from membership in that society and also from membership in the Medical Society of the State of New York. Rubin is the so-called medical director of the Gotham Corporation, which sells on the mail-order plan an alleged cure for obesity. It was exposed in The Journal, March 1. Rubin also exploits the "Radiendocrinator."—Journal of the American Medical Association.

## ROCHESTER DENTAL DISPENSARY

### Annual Report

### Dental Department

| | 1922 | 1923 |
|---|---|---|
| Tooth Treatments | 3,389 | 2,971 |
| Root Treatments | 1,493 | 3,017 |
| Root Fillings | 791 | 1,285 |
| Amalgam Fillings | 24,912 | 31,511 |
| Synthetic Fillings | 1,927 | 834 |
| Cement Fillings | 24,130 | 20,236 |
| Gutta-percha Fillings | 1,884 | 1,713 |
| Silver Nitrate Treatments | 10,563 | 8,012 |
| Pulps Capped | 537 | 629 |
| Crowns | 35 | 32 |
| Inlays | 61 | 31 |
| Orthodontia Treatments | 9,265 | 11,734 |
| Extractions | 15,215 | 16,493 |
| Extractions Novocain | 1,574 | 1,905 |
| Extractions Nitrous Oxid | 71 | 53 |
| X-Rays | 2,065 | 4,166 |
| Prophylactic Treatments | 1,435 | 955 |
| Devitilizations | 652 | 843 |
| Gum Treatments | 2,359 | 2,161 |
| Abscess Treatments | 288 | 254 |
| Pulp Pressure | 88 | 115 |
| Bridge | 1 | 3 |
| Plates | 25 | 25 |
| Number of visits to Dispensary | 65,079 | 67,530 |
| Number of patients paid 5c | 55,809 | 58,253 |
| Dismissals | 9,899 | 12,595 |
| Prophylactic Treatments in schools | 75,350 | 92,202 |
| Number lectured to in schools | 49,592 | 55,536 |
| Orthodontia cases under treatment | | 347 |

### Surgical Department

| | | |
|---|---|---|
| Tonsil-Adenoid Operations | 1,709 | 1,686 |

## NORTH CAROLINA

**Public School Clinics:** In the school clinics organized by the North Carolina State Board of Health for the purpose of correcting the most common physical defects and those admittedly recognized as handicaps to large groups of children, dental work has been carried on in practically every rural community, city and town since July, 1918, in the state of North Carolina, and more than 110,000 children have received free dental treatment, according to G. M. Cooper, writing in the Nation's Health. The nurse in charge of the county work handles the finances. She alone knows who pays the charge and who does not. The operator does not know and does not care which children are accepted for charity. The school clinics are financed by the state board of health from funds appropriated by the legislature for the purpose. Many local boards and some city organizations during the past year supplemented these funds, particularly for the maintenance of dental clinics; that is, they are allowed to reimburse the state board of health at the rate of $75 per week for as many weeks as is desired for the dental clinic to remain in a given community after the expiration of the time allotted by the state board of health.

## FOREIGN

**Medical Commissions in Belgium:** These boards perform the duties of a commission of public health in their respective districts. The medical commissions are authorized to (1) examine the credentials of those who settle in their district to practice any branch of the healing art; (2) to furnish certificates to those who desire to become midwives, dentists or nurses; (3) to see that the healing arts are practiced properly and in a regular manner; (4) to supervise everything that concerns the health of the people, and (5) to control contagious diseases and epidemics in their district.—Journal of the American Medical Association, May 31, 1924.

**Brown Bread Versus White Bread:** Dr. Van Nypelseer has made an ardent plea in the Bruxelles medical to reduce the consumption of white bread. He says that its use as food is not based on observed facts, and that it is in opposition to biologic principles. Neither the Academy of Medicine nor physiologists recommend bread made from highly bolted flour. Grain merchants and stock raisers oppose it. The increase in the consumption of white bread in western Europe is due to selfish interests, ignorance and blindness. It constitutes a grave social danger. Bread should be made from good wheat flour, ground between millstones, and bolted so as to retain from 85 to 87 per cent of the grain. The removal from flour of essential parts of grain induces tuberculosis, rickets and nervous and mental debility.—Belgium Letter, Journal of the American Medical Association, May 31, 1924.

**Dental Clinic for Dover:** This clinic, the gift of the mayor and his wife, was opened May 9, according to the Dental Surgeon, May 24, 1924. Visitors are at once impressed by the brightness that prevails throughout the rooms, and the steps taken to prevent germs or dust gaining a footing there. The lighting and ventilation are perfect, and the white glazed bricks, white enamel and light distempered walls everywhere, fully accord with modern hygiene. The president of the board of education, who was present, expressed his gratification at the wise use of wealth in establishing institutions and promoting experiments in matters the value of which was not yet completely understood by the great mass of the people. Attention to the dental condition of children was a matter of enormous importance educationally, he said. In the last ten years, the number of dental clinics in the country had risen from 150 to 1,029—a splendid advance during those difficult years. He gave figures showing the great improvement brought about by the dental attention given to the children in the London County Council schools since 1913, and said: "You cannot have a people with an A1 intellect if they have C3 teeth," adding that there was nothing in which more real improvement could be made in a short time with comparatively little effort than in this question of giving our children better teeth.

**Dental Spar:** Attention has recently been called to the fact that Canada possesses one of the very few known deposits of dental spar, the superior grade of snow-white potash feldspar, much used in the manufacturing of artificial teeth, and, according to the Ottawa Department of Mines, an attempt is being made to interest the British market in this product so that we may soon, in a manner of speaking, get our artificial teeth, as well as our bread, apples and tinned salmon, from the Dominion. The annual output of dental spar is only a few hundred tons, most of which goes to the United States, those experts in dental science. Some of the spar is reexported to this country and to Europe generally. If Britain bought direct, she would thus save the middleman's charges. Canada has also a large output of crude feldspar as used by the potteries. Large quantities of this, too—as much as 39,000 tons in a single year—go to the Eastern United States.—Dental Surgeon, May 24, 1924.

**Educational Grants Committee Report:** The Dental Board of the United Kingdom decided in May last that grants to dental schools should be used primarily for the purpose of increasing the capacity of the schools to train students, and should be allocated to schemes for the extension of premises or schemes for improvement in accommodation and equipment. This defines the purposes for which grants can be made, and imposes on the Committee the duty of seeing that no part of any grant is applied to the purposes of the dental hospitals as distinguished from the schools associated with them. The principle is clear, though in practice its application may be difficult, because it appears that the accounts of the school and the hospital are frequently confused, and in

some cases the hospital controls the school. In the distribution of grants it is suggested that preference should be given to those schools which are already overcrowded or give evidence of rapid growth. The object of the Board is to increase the output of dentists, and it seems useless to spend money on extending schools which are not yet full, except in so far as they can satisfy the Board of their inability to provide all the equipment necessary for efficient teaching. The principle advocated is that grants should be given to schools where the biggest return, in terms of students trained, may be expected.—Dental Record, May, 1924.

**Steel Dental Plates:** Gold is scarce in Germany and the Krupp concern is furnishing a substitute for dental plates in the form of a rustless chromo-nickel steel. The firm's dental clinic is supplying dentures to the staff and orders for plates, bridges and crowns in the new material are being executed for outside practitioners. The new medium is so tough that it is impossible to break or bend it. It is said to be less than half the weight of gold and one-fourth the price.—Daily Mail (London).

**"The Narrowing British Face":** Lecturing to the dental board at the Royal College of Surgeons, Sir Arthur Keith stated his belief that future discoveries would reveal a common cause for enlarged tonsils, adenoids, irregular growth of teeth and contracted palates. All these, he asserted, could be traced to a disturbance of the elaborate system of hormones, which interfered with the normal course of growth. The nature of the disturbance was a mystery. It might be due to a diet in which some vital quality was missing or to insufficient light. Whatever the solution, his researches had shown that the shape of the mouth was changing, the palate becoming more narrow and the face longer. These conditions were rarely found in British skulls of the pre-Roman period, nor were they normal in Saxon skulls until the eighteenth century, when England became industrial on a great scale. Keith has devised a rapid method for recording and measuring the shape of the mouth by getting students and others to bite a piece of card coated with wax. This has shown him that a large percentage of the population have not even the remnants of molar teeth, and that at least 25 per cent have grossly deformed palates and corresponding dental irregularities unknown in the stone and bronze ages. Keith emphasized the fact that the teeth of nearly every person in England overlap; that is, the teeth of the upper jaw overlap those of the lower. This was never found in skulls of the early periods; in all these the teeth met evenly.—London Letter, Journal of the American Medical Association, May 24, 1924.

## GENERAL

**Inquiry into Nitrous Oxid Gas:** The Medical Research Council and The Anaesthetics Section of the Royal Society of Medicine have appointed a committee to initiate and direct investigations tending toward a more accurate knowledge of the modes of action of various anesthetic agents and of the impurities that may be associated with them, according to the Dental Record. An immediate investigation is to be made into the nature and frequency of impurities that may occur in nitrous oxid gas, for which there is no generally recognized standard of purity, and which is not subjected to official tests. It is believed that the toxic effects sometimes resulting from administration of "gas" calls for an examination, and the committee are seeking any relevant information.

**Conference on Medical Problems of Indians:** Representatives of the Department of the Interior, physicians of McKinley County and all physicians in the employ of the Indian Service on the local Indian reservation met at Gallup, April 21, to confer on health problems which concern the Indian. Dr. Hubert Work, Secretary of the Interior; Commissioner Burke, Bureau of Indian Affairs; Dr. John McMullen, trachoma specialists, U. S. Public Health Service; Dr. Robert E. Lee, Newberne, chief medical supervisor of the Indians; Herbert G. Hagerman, Commissioner of the Navajo Indians; Dr. Rudolph D. Moffet, New York City, head of the Presbyterian mission work; Dr. George S. Lukett, state director of public health; Dr. James W. Bazell, Navajo County health officer, and others from distant places were present. The morning session of the conference was given over to a discussion of trachoma, and the afternoon session to tuberculosis. It was shown that there are about 35,000 Indians on the Navajo reservation, and that only nine

physicians were on duty with them. It was mentioned that the Indians are scattered over a wide territory, and that it is difficult to keep the allowed quota of physicians among them, owing to the isolation and the inadequate salaries which physicians receive for this service. The fact was brought out that physicians on the reservation are under the supervision of school superintendents, who are only directly interested in medical problems. Dr. Work agreed to organize the medical service with a physician in Washington at its head, but he considered it impossible to accomplish all that had been suggested at this conference, owing to a lack of funds. He called attention to the fact that this is not entirely a government problem, and that local and state health officers should become actively engaged in a campaign against trachoma and tuberculosis, particularly in preventing their spread among the white population.—Journal of the American Medical Association, June 7, 1924.

**Revised List of Health Films:** A new and revised edition of its mimeographed list of health films has been prepared by the National Health Council. The list, which presents data on more than 300 motion pictures featuring health topics, may be obtained for a nominal price from the National Health Council, 370 Seventh Avenue, New York.—National Health Council Monthly Digest, New York, March, 1924.

**Things Which Cannot be Copyrighted:** There are many things on which copyright cannot be secured but for which application is frequently made. In this class, undoubtedly more applications are made for registration of names than for anything else. Covering these the copyright office has published a special circular which states: "The Copyright Law contains no provision under which registration can be made of a name, as such, to secure the exclusive rights to use it in business of any kind. Entry cannot, therefore, be made in the copyright office for coined names, names of articles of manufacture; names of games or puzzles; names of substances; names of products; names of medicines, names of theatrical combinations or groups; stage names; professional names; business names, or names of companies or corporations."

Mere words or phrases cannot be registered separately for protection under the copyright laws. Thus, forms of words having mainly a special purpose, such as advertising phrases, or so-called slogans, legends, mottoes, catch words, riddles, sign-board inscriptions, and any similar mere combination of words are not subject to registration in the copyright office.

Numerous applications for copyright on filing and other forms reach the copyright office. However, the statute designating the classes of articles which may be registered does not mention blank forms or blank books. The United States Court which has jurisdiction in cases arising under the copyright laws has held that blank forms or blank books or similar articles for use in themselves are not subject to copyright nor are systems, plans or methods. Sometimes charts, forms and the like may be patented.

Titles, as such, cannot be copyrighted. It is frequently possible to protect them, however, with phrases and other word combinations, under general rules of law relating to unfair competition. Many combinations of words conform to the legal definition of a trademark and may be registered as such in the Patent Office. But the Copyright Office has nothing to do with such protection.—Business Progress Bulletin, April 29, 1924.

**Educational Program of the American Association of University Women:** A grant of $27,000 from the Laura Spellman Rockefeller Memorial Fund was made in February for the use of the education committee of the American Association of University Women. The grant will be used for the advancement of modern education through studies of the preschool child and of elementary education.—Journal of the American Association of University Women, Washington, January-March, 1924.

**A Quart of Milk a Day for Children,** but be sure it is clean and pure milk. Milk is a very important food not only for infants and children but also for adults. It is an almost perfectly balanced food, containing practically all of the necessary elements for the growth, energy and repair of the body in about the right proportions and in readily digestible form. The importance of milk as an article of diet for children is emphasized by the fact that it is the only food that provides sufficient lime for the proper development of the teeth without including an oversupply of other food elements.

Children should have at least a quart of milk or its equivalent in milk products daily.—Dr. Mathias Nicoll, Jr., Commissioner of Health of the State of New York.

**The Personality of the Patient:** Medicine aims to explain the patient in terms of diagnosis, and to serve the patient in terms of treatment. This treatment may be with materia medica, surgery, physical therapy, rest or exercise, massage or electricity, climate or baths; with psychic treatment, by a knowledge of the personality of the patient. We can view the patient in a perfectly common sense way and fit the facts of his personality in the practical data of clinical medicine. There is nothing so scientific as common sense. The patient is more than a disease; he is a complete psychobiologic unit. We have been good anatomists and poor psychologists. Probably the next great function of scientific medicine as a whole is the study of the relations of the mind and body. The patient with abnormal psychology is too often uninteresting to the clinician. In a large sense, the physician should be the best psychologist. Psychology becomes a scientific study of the behavior of human beings as an outward manifestation of complex mental processes. The whole universe is a question mark, and every patient is a little question mark who brings not only his disease, if he has any, but also the impression that life has made on his personality. It takes but little time to tap the psychology and the personality of the patient. It is far from necessary in every case, but in those patients without apparent physical reason after careful study of their complaints, in the extremely temperamental, the emotional and the frankly psychoneurotic, it is the evident method. To consider each patient as a human problem and to study him in his own individual "setting" in life, when necessary, is to enlarge the vision and the function of clinical medicine. Once satisfied that there are no gross pathologic changes, further and more confident search of the personality is in order. Caution, conservation and faith are all essential.—Dr. Stewart R. Robert, Journal of the American Medical Association, April 26, 1924.

**In the Course of an Address** to a gathering at the Royal Institute of Public Health, London, Dr. B. T. J. Glover, chief tuberculosis officer for Liverpool, said, "I am quite satisfied that a large number of people who go into sanitoria for treatment should really have gone to the dentist; their condition having been brought about by defective teeth."—Dental Surgeon, March 22, 1924.

**Birmingham Dental Hospital:** The menacing load of debt with which the institution yearly finds itself encumbered was referred to at the annual meeting of the Birmingham Dental Hospital, and an appeal was made for increased subscriptions and donations. The sixty-third annual report recorded an increase in the work accomplished for patients, and also in the number of new patients registered as compared with the previous year. It had been stated that the health of a nation depended upon the dentists. The existence of an efficient dental hospital certainly lessened the work for other hospitals, for dental fitness was the basis of good health, and was undoubtedly a great factor for the prevention of disease. The hospital was founded in 1858, and its work had gradually increased in size and importance until it was now regarded as one of the most important institutions of its kind, and was a real asset and a great benefit to the city and immediate districts.—Dental Record, May, 1924.

## DENTAL CORPS

**Army:** Lieutenant Colonel Robert H. Mills, from duty as attending dental officer, Boston, May 10, and detailed as professor of military science and tactics, Northwestern University Dental School, Chicago.

Major Don G. Moore, from duty at Army medical center, Washington, July 1, to duty at Fort Benning. Ga.

Major Robert B. Tobias, from duty at station hospital, Fort Benning, Ga., to Fort Sheridan, Ill., for duty.

Captain Richard C. Hughes, from duties at Fort Sam Houston, Texas, June 3, to San Francisco and about August 21 to Panama Canal Department for duty.

## JUNIOR OFFICERS IN THE NAVY

### May 5, 1924

The following are the last officers who either have been commissioned in or have become due for promotion to the various ranks of the Navy:

### Dental Corps

Lieutenant Commander T. L. Sampsell.

Lieutenant R. D. Reid.

Lieutenant (J. G.) F. A. Richison.—Army and Navy Register, May 17, 1924.

# Announcements

## CALENDAR OF MEETINGS

### NATIONAL SOCIETIES

American Academy of Periodontology, October 7-9, 1924, Atlanta, Georgia.

American Dental Assistants' Association, November 10-14, 1924, Dallas, Texas.

American Dental Association, November 10-14, 1924, Dallas, Texas.

American Dental Trap Shooters' Association, November 10, 1924, Dallas, Texas.

American Society of Dental Radiographers, November 7 and 8, 1924, Dallas, Texas.

Canadian Dental Association, August 4-7, 1924, Vancouver, B. C.

Dental Protective Association of the United States, 4:00 p. m., December 15, 1924, Palmer House, Chicago, Illinois.

Federation of American Women Dentists, November 10-12, 1924, Dallas, Texas.

Federation Dentaire Internationale, August 6, 1924, Luxemburg.

National Association of Dental Examiners, November 10, 11, 1924, Dallas, Texas.

### STATE SOCIETIES

National Capital, at Washington, D. C., first Tuesday of every month.

July

Wisconsin, at Milwaukee (8, 9, 10).

September

Maryland, at Frederick (22-24).

October

Susquehanna, at Wilkes-Barre (21-23).

November

American Dental Association, at Dallas (10, 11, 12, 13, 14).

Arizona, at Phoenix.

Texas, at Dallas (10, 11, 12, 13, 14).

December

Ohio, at Dayton, (2, 3, 4).

February (1925)

Minnesota, at Kenwood Armory, Minneapolis (10-13).

### MEETINGS OF STATE BOARD OF DENTAL EXAMINERS

Arkansas, at Little Rock, July 3-5. Secretary, I. M. Sternberg, Merchants Bank Building, Fort Smith, Arkansas.

North Dakota, at Fargo, July 8. Secretary, W. E. Hocking, Devils Lake, North Dakota.

### MARYLAND STATE DENTAL ASSOCIATION

The semiannual meeting of the Maryland State Dental Association will be held at the Francis Scott Key Hotel, Frederick, Md., September 22-24, 1924.

NORVAL H. McDONALD, *Secretary,*
304 Morris Building, Baltimore, Md.

### SUSQUEHANNA DENTAL ASSOCIATION

The Susquehanna Dental Association will meet, October 21-23, 1924, at Irem Temple, Wilkes-Barre, Pa.

For further particulars, address

FULLER L. DAVENPORT,
*Chairman, Executive Committee,*
520-524 Miners Bank Bldg., Wilkes-Barre, Pa.

### AMERICAN DENTAL TRAP SHOOTERS' ASSOCIATION

The second annual meeting of the American Dental Trap Shooters' Association will be held at Dallas, Texas, November 10, 1924. The report of the 1923 meeting will be published in the convention number of THE JOURNAL.

CHARLES W. MILLS, *Secretary,*
52 West Second Street, Chillicothe, Ohio.

## THE AMERICAN ACADEMY OF PERIODONTOLOGY

The eleventh annual meeting of the American Academy of Periodontology will be held at Atlanta, Ga., October 7-9, 1924, at the Biltmore Hotel, Thursday, October 9, there will be a joint meeting of the Academy and the Georgia State Dental Society. A cordial invitation is extended to all members of recognized dental societies.

OLIN KIRKLAND, *President,*
723 Shepard Building, Montgomery, Ala.
J. HERBERT HOOD, *Secretary,*
624 Hanna Building, Cleveland, Ohio.

## AMERICAN DENTAL ASSISTANTS' ASSOCIATION

The committee appointed, September 12, 1923, at Cleveland, Ohio, for the organization of an American Dental Assistants' Association are perfecting arrangements for a meeting to be held by representatives of all dental assistants' societies at the time of the meeting of the American Dental Association at Dallas, November 10-14, 1924. A program of interest is being arranged and a cordial invitation is extended to all dental assistants to attend the meetings.

JULIETTE A. SOUTHART, *Chairman,*
174 West Ninety-Sixth St., New York City.
JESSIE C. ELLSWORTH, *Vice-Chairman,*
30 North Michigan Ave., Chicago, Ill.

## RESOLUTIONS OF WORCESTER DISTRICT DENTAL SOCIETY ON THE DEATHS OF DRS. FITZGERALD, MARGOLIS AND GOULD

WHEREAS, Our heavenly Father has called to his reward our friend and brother practitioner, Dr. Thomas A. Fitzgerald, be it

*Resolved,* That this society extend to the bereaved family its profound expressions of sympathy and deep regret at a loss so great; and be it further

*Resolved,* That a copy of these resolutions be forwarded to the bereaved family, a copy to THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION and *Dental Cosmos* for publication, and a copy entered as a part of the records of this society.

WHEREAS, It has been the will of Him who is supreme to remove from our company a new member and friend, Dr. David Margolis, now, therefore, be it

*Resolved,* That with his sudden death at the beginning of his years of best usefulness we feel a sense of deep loss, and be it further

*Resolved,* That a copy of these resolutions be spread upon the minutes of the Worcester District Dental Society, a copy be sent to his family and a copy to *Dental Cosmos* and THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION.

WHEREAS, It has pleased our Heavenly Father to take from our midst an honored officer of our society, a friend and co-worker, Dr. Clifton S. Gould, be it now

*Resolved,* That we express herein our feeling of deep loss, that we shall miss most keenly his quiet friendly companionship, his work and judgment as a professional colaborer, and be it further

*Resolved,* That a copy of these resolutions be placed on the minutes of this society, a copy be forwarded to the bereaved family and a copy to THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION and *Dental Cosmos* for publication.

GEORGE COWLES BROWN, D.D.S., *Secretary.*

## DALLAS

Dallas is easily reached, being served by eight steam railway systems, entering its Union Terminal Station, which cost, with terminals, $6,300,000. Five electric interurban railway lines operate 222 trains daily, centering at the $1,000,000 Interurban Union Station. Dallas has twenty steam and electric railway outlets. Testifying to the importance of the city as a tonnage assembling center, thirty-two "off-line" railroads maintain offices here, as do several important steamship lines. Excellent paved highways lead out of Dallas in every direction. Two million people live within a 100-mile radius of Dallas.

While Dallas has, perhaps, but few points of historic or romantic interest, the growth of the city has been so rapid that this fact in itself is noteworthy. In no country save America could one find a city making the well-rounded and substantial growth that Dallas has in the brief fifty-odd years that it has been incorporated. This growth is a true commentary on the development of the Southwest. Dallas was founded by Colonel John Neeley Bryan of Tennessee, who built a pole hut here in 1841, with his Indian pony as his only companion. While the town had but 5,000 people when incorporated as a city in 1871, it now ranks, according to the 1920 federal census, as the forty-second city of the Nation, having vaulted from fifty-eighth in 1910 and eighty-sixth in 1900. The city directory gives Greater Dallas, roughly, an area with a radius of 6

miles, a population of more than 230,000. Dallas' showing in the federal census is not so good, because of its constricted city limits, but 23 square miles when the last census was taken.

The Dallas skyline has been ranked by leading magazines as the second most impressive on the American continent. It has more than 100 buildings ranging from five to twenty-nine stories in height. The $5,000,000 Santa Fe Terminal Building, with 31½ acres of floor space, now being built in the heart of the city, is one of the largest buildings under construction in the world today. It is being erected in four units, the tallest of which is nineteen stories, each connected underground by railroad tracks. An important building under way is the twenty-story Republic Bank Building, to cost $1,000,000. Another is the $2,000,000 Melrose Court Apartment Hotel. Still another is the splendid structure of the Dallas Athletic Club.

Building permits in Dallas the past five years have exceeded $85,000,000, giving Dallas the rank of twenty-third in the Nation in total value and second in per capita value. Included in the permits are more than 12,000 residences. Dallas is a strong open shop city and since the formation of the Open Shop Association here by the Chamber of Commerce in 1919 there has not been a single serious labor disturbance.

Further indicative of the growth of Dallas are the facts that, in eight years, bank clearings have grown from $400,000,000 to $1,800,000,000; in twenty-three years assessed valuations of property in Dallas have increased 800 per cent; public school enrollment has grown from 13,000 to 38,000 in seventeen years; jobbing business, in thirteen years, has increased from $125,000,000 to $700,000,000 annually, and the manufacturing output of Dallas has grown from $16,000,000 to $125,000,000 in nineteen years.

Textile manufacturing is one line in which great development at Dallas is anticipated. Dallas for many years has had the oldest and largest cotton mill in the state, and last year the Chamber of Commerce organized the $1,000,000 Dallas Textile Mills Company, which built during the year and now has in operation a 10,000-spindle mill.

Dallas leads the world in the manufacture and distribution of cotton gins, cotton handling machinery, and saddlery, harness and leather goods. To put it more concisely, almost every other cotton gin in the world is made in Dallas. It is the world's third largest distributing depot for farm implements and machinery, and it leads the Nation in the manufacture and distribution of cotton-seed products. Other leading lines made in or distributed from this city are: dry goods (Dallas ranking as the fifth largest dry goods market in the Nation), automobiles, building materials, drugs, office supplies, musical goods, hardware, oil field supplies, jewelry and optical goods, soda fountains, electrical goods, groceries, bakery products, furniture, books, printing equipment, bagging and ties, barber's supplies, photographic goods, flour and many others.

Dallas is in the heart of what is known as the "black-land belt," famed for agricultural production. The city is the principal distributing center for the Southwest, comprising all or parts of Texas, Oklahoma, Arkansas and Louisiana. This territory has produced about $5,000,000,000 worth of new wealth in a single year, or about $2,500 to a family of five. Most of this production was along agricultural lines. As this record was made with only one-fourth of Texas' available tillable land in cultivation, an idea as to the potentialities of the territory may be had. In 1923, Texas produced 11.2 per cent of the Nation's crops, including 42 per cent of the Nation's cotton. The Southwest produces about one-half of the oil of the Nation. The value of Texas' livestock is in excess of $300,000,000. Texas has a land area of 262,398 square miles, and if all of the people of the United States were to move to Texas, it still would be no more densely populated than is Massachusetts today.

The Federal Reserve Bank of the Eleventh District is located at Dallas. The city is the principal financial center of the Southwest, having thirteen national or state banks, which, Dec. 31, 1923, had deposits of $128,829,981 and resources of $152,914,761. The postal receipts for 1923 totaled $3,010,318. Dallas has 48,600 telephone connections, 44,992 gas connections and 45,100 electric light connections. The motor vehicle registration of the county is 51,060.

Dallas is an educational center, with eighty colleges, universities and private schools, and forty-five public schools. Among its leading colleges are Southern Methodist University, Dallas University, St. Mary's College and the medical, dental, pharmacal and school of nursing departments of Baylor University. Dallas is renowned as a church center, having about 200 churches.

## EXAMINATION FOR ARMY DENTAL CORPS

An examination of candidates for appointment and commission in the Dental Corps of the Regular Army will be held during the

week commencing Monday, July 14, 1924. The Surgeon General of the Army asks that all means be used for disseminating this information for the benefit of prospective candidates. At that time, it is expected there will be four vacancies in the Corps.

The law governing appointments in the Dental Corps requires that a candidate, to be eligible, must be a citizen of the United States between the ages of 23 and 32 years, a graduate of a recognized dental school, must have been engaged in the practice of his profession for at least two years subsequent to the date of his graduation and must hold a commission in the Dental Reserve Corps.

Army regulations require that a candidate must undergo a preliminary and a final examination. At the time of the preliminary examination, he must be not less than 22½ years and not more than 31¾ years of age. Should he be successful in the preliminary examination, which covers professional subjects, he will be granted a commission in the Dental Reserve Corps, if he does not already hold such a commission. It is, therefore, not necessary that a candidate hold commission in the Dental Reserve Corps when applying for examination. All candidates who successfully undergo the preliminary examination are ordered to active duty at the Medical Field Service School, Carlisle Barracks, Pennsylvania, or the Army Dental School, Army Medical Center, Washington, D. C., for observation and instruction for a period of approximately four months; on completion of which they are required to undergo a final examination in the subjects covered during the instruction period and receive final rating of their general aptitude for the service. If successful therein, they are commissioned as first lieutenants in the Dental Corps, Regular Army.

Former officers of the Dental Corps, Regular Army, honorably separated from the service, within the prescribed age limit and otherwise eligible, will be permitted to compete in the examination. Blank forms for making application for this examination may be obtained at any Corps Area Headquarters or Military Station, or from the Adjutant General of the Army, Washington, D. C. Approved applicants will be informed in ample time as to the exact place and date of the nearest examination.

No allowances can be made for the expenses of applicants undergoing examination, whether incurred in travel to and from or during their stay at the place of the examination. Public funds are not available for the payment of such expenses.

## DEEP SEA FISHING

May 30, 1924.

Journal of the American Dental Association,
Dear Sirs:

Enclosed find picture of some of our Long Beach dentists and their catch of barracuda. Deep sea fishing, a day a month, is now observed among Long Beach dentists. Barracuda are caught by trolling from power boats, and the fishing requires a full day of pleasure. Our next day out will be Wednesday, July 16, at 8 a. m., from Long Beach. Tuna will be running. This fish, which weighs between 15 and 150 pounds, is also caught by trolling.

**Left to right: Drs. Strong, Nye, Casper, Chuck, Murphy, Borland and Furie.**

From seven to ten men fish from a boat, and any number of boats can be arranged for. Out-of-town dentists planning a trip to California's wet spot and desirous of making this trip should communicate with the secretary of the Long Beach Dental Society.

W. F. FURIE, *Secretary*,
703 Farmers and Merchants Bank Building,
Long Beach, Calif.

## REPORT OF THE AMERICAN RELIEF FUND COMMITTEE FROM NEW YORK STATE*

Rochester, New York.
May 1, 1924.

Dr. Otto U. King, Sec'y. and Editor,
Dear Doctor King:

The American Dental Relief Fund Committee of the State of New York respectfully presents for your consideration the attached report.

Contributions received by Dr. R. Ottolengui

*Submitted, May 1, 1924.

have already been forwarded to your office. Please find check for the balance amounting to $445.50.

Sincerely,

EDWARD G. LINK and R. OTTOLENGUI
*Committee.*

Subscriptions secured by Edward G. Link and R. Ottolengui for the American Dental Relief Fund for 1923.

| | | |
|---|---|---|
| 1st District Dental Society | $100.00 | |
| 2nd District Dental Society | 100.00 | |
| DENTAL TRADE | | |
| Dentists' Supply Company | 100.00 | |
| Columbia X-Ray & Electric Corp. | 25.00 | |
| Novocol Chemical Mfg. Co. | 25.00 | |
| H. A. Metz Laboratories | 25.00 | |
| Faucett & Faucett | 10.00 | |
| Colgate & Company | 10.00 | |
| Julius Aderer Inc. | 10.00 | |
| Samuel G. Supplee | 10.00 | |
| Chayes System Laboratories | 10.00 | |
| Borine Mfg. Co. | 10.00 | |
| Geo. A. Wiechert Co., Inc. | 5.00 | |
| E. R. Squibb & Sons | 5.00 | $445.00 |
| 7th District Dental Society | 100.00 | |
| 8th District Dental Society | 150.00 | |
| Rochester Dental Society | 100.00 | |
| Dr. E. L. Schlottman | 5.00 | |
| E. G. Link | 5.00 | |
| Dr. John L. E. Banks | 2.00 | |
| Dr. Louis S. Goble | 2.00 | |
| Dr. Paul Jones | 2.00 | |
| Dr. James V. Maloney | 1.00 | |
| DENTAL TRADE | | |
| Primrose-Johnson Dental Co. | 25.00 | |
| Wilmot Castle Co. | 25.00 | |
| Ritter Dental Mfg. Co. | 15.00 | |
| Starr-Norton Co. | 15.00 | |
| Heusner & Piehler Co. | 5.00 | |
| Mr. James S. Hulme | 2.00 | $454.00 |
| Total | | $899.00 |
| Expenses | | $ 8.50 |
| Balance | | $890.50 |

## NEW BOOKS RECEIVED FOR THE LIBRARY OF THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

The Journal of the American Dental Association promptly acknowledges herewith the receipt of new publications. Books selected from those named on this list are reviewed below. Reviews are matter-of-fact statements of the nature and contents of the publication referred to and are intended *solely to guide possible purchasers.*

*Crown and Bridgework, for Students and Practitioners.* By Frederic A. Peeso, D.D.S., Director of the Dental Graduate School of Columbia University, New York. Philadelphia and New York: Lea and Febiger; Second Edition, Thoroughly Revised, 1924. Price $6.50. Pp. 480, with 731 engravings.

RECENT HEALTH PUBLICATIONS

*Child Health Program for Parent Teacher Associations and Women's Clubs.* By Lucy Wood Collier, revised by Harriet Wedgewood. Health Education No. 5, U. S. Bureau of Education, Washington, 1924.

An entirely new bibliography is included in the revised edition of this bulletin.

*The Program for Oral Hygiene in the Public Schools of Minneapolis, Minn.* By F. Denton White, D.D.S., Supervisor of Oral Hygiene in the Public Schools, Minneapolis, Minn. Reprint No. 890, from the U. S. Public Health Reports, Dec. 21, 1923. U. S. Public Health Service, Washington, 1924.

*What Your Dentist Owes You.* By Anna Reginalda Bolan, in *Hygeia,* June, 1924.

*A Journey to Health Land.* Book One of the Story Series in Health. By J. Mace Andress, Lecturer on Health Education, Boston University; and Annie Turner Andress, formerly head of the Kindergarten Department, State Normal School, Worcester, Mass. Boston: Ginn & Co. Price 72 cents. Pp. 192.

*Health Training in School.* A Handbook for Teachers and Health workers. Prepared for the National Tuberculosis Association by Theresa Dansdill, in consultation with Charles M. DeForest, Crusade Executive, National Tuberculosis Association. Third Edition. New York: National Tuberculosis Association. Pp. 405.

## PATENTS RELATING TO DENTISTRY

1434381. Hypodermic syringe, Sigmund A Giedroye, Vineland, N. J.

1434436. Toothbrush, Harold W. Goff, New York, N. Y.

1434894. Holder for dental X-ray films, Lee A. J. Hawkins, Jerome, Ariz.

1435015. Sectional laboratory table, Tiodolf Lidberg, Chicago, Ill.

1434921. Displaying collapsible tubes, Wm. W. Simpson, Sewickley, Pa.

1435143. Sterilizer, Arthur W. Bensman, Buffalo, N. Y.

1435902. Dental instrument, Raymond A. Derbyshire, Skowhegan, Maine.

1435456. Dental soldering stand, John H. Dyblie, Joliet, Ill.

1435826. Dental flask clamp, John M. Filer and S. E. Rupe, Altoona, Pa.

1435601. Teeth and backings therefor, Frank Z. Hanscom, Elmhurst, Ill.

1435641. Toothbrush, Wm. J. Hines, Hartford, Conn.

1435622. Sanitary holder for collapsible tubes, Charles A. Price, Washington, D. C.

1435498. Dentifrice, Ernest D. Resnik, New Haven, Conn.

1435659. Method of and apparatus for making sheet rubber, Fred T. Roberts, Cleveland, Ohio.

1435558. Fountain attachment for toothbrushes, Jacob P. Sencindiver, Baltimore, Md.

1435189. Clamping device for molding flasks, Harry Uriass, Lancaster, Pa.

1435909. Lingual bar, Mario F. Arata, San Anselmo, Calif.

1436305. Centrifugal casting, Leon Cammen, Tuckahoe, N. Y.

1436016. Temporary tooth, George R. De Nise, Rochester, Minn.

1436506. Poison bottle, William F. Laing, Cumberland, Md.

1436528. Toothpick cutter and dispenser, James Powers, Los Angeles, Calif.

1436647. Dental vibratory apparatus, Dayton Bumgardner, Chicago, Ill.

1437290. X-ray tube shield, Wm. D. Coolidge, Schenectady, N. Y.

1436756. Centrifugal casting machine, Fred Ellis, Salem, Oregon.

1436707. Adjustable and safety device for hypodermic needles, George Gaschke, Newark, N. J.

1437249. Collapsible tube, Walther Kalb, Leipzig, Germany.

1436883. Fountain toothbrush, Charles J. Koepke, Chicago, Ill.

1437151. Collapsible container, Charles Riley, Chicago, Ill.

1437882. Sterilizer, E. J. Barrows, Fort Wayne, Ind.

1437493. Flexible shaft, Alfred J. Cawse, Prince Bay, N. Y.

1438021. Dental furnace, Thomas M. Dudgeon, Avalon Borough, Pa.

1437934. Collapsible tube, George W. Fullerton, Cincinnati, Ohio.

1437844. Apparatus and process for producing dental impressions, Henry J. Henderson, Victoria, Canada.

1437596. Bur stand, F. W. Korb, Cleveland, Iowa.

1437995. Surgical and dental instrument, Gustav F. Richter, Brooklyn, N. Y.

1438064. Dental pellet, Bert G. Simmons, New Brunswick, N. J.

1437827. X-ray dental film package, Albert F. Sulzer and H. G. Dewey, Rochester, N. Y.

1438168. Dental root or tooth dresser, Isaac Brown, New York, N. Y.

1438167. Flexible dental bridge attachment, Isaac Brown, New York, N. Y.

1438500. Stereoscopic X-ray apparatus, Leslie R. McDonald, Montreal, Can.

1438939. Floss holder, Louise C. Ball, New York, N. Y.

1439508. Artificial tooth, Raphael A. De Rome, Chicago, Ill.

1439076. Floss carrier, Francis W. Edwards, Elmhurst, N. Y.

1439370. Metal-bur filer, Louis A. Lambert, Rome, N. Y.

1439022. Dental device, Delvan W. Quilling, Minneapolis, Minn.

1439279. Toothbrush, Howard R. Ward, New York, N. Y.

1438975. Instrument for handling dental clamps, Frank Wiggins, Knoxville, Tenn.

1440231. X-ray stereoscope, Byron Y. Miller, San Luis Obispo, Calif.

1439910. Mouth appliance, Joseph Posa, Bridgeport, Conn.

1439913. Toothbrush, Alexander Saxe, New York, N. Y.

1439914. Toothbrush, Alexander Saxe, New York, N. Y.

Copies of above patents may be obtained for twenty-five cents each, by addressing John A. Saul, Solicitor of Patents, Fendall Building, Washington, D. C.

# DENTAL HEALTH EDUCATION

## EDUCATIONAL MATERIAL

The American Academy of Periodontology has granted the American Dental Association the privilege of distributing the bulletins compiled and copyrighted by the Academy. Orders for "How to Build Sound Teeth" and "Children's Teeth—How to Build and Use Them," which were published in the May issue of THE JOURNAL may be sent to the American Dental Association, Department of Dental Health Education, 5 North Wabash Avenue, Chicago, Ill. Prices follow:

Single bulletins

| | |
|---|---|
| 1-10 copies, postage prepaid | 5c each |
| 10-100 copies, postage prepaid | 4c each |
| 100 copies, postage prepaid | $ 3.00 |
| 500 copies, expressage collect | 12.50 |
| 1,000 copies, expressage collect | 23.00 |

Two bulletins in one*

| | |
|---|---|
| 1-10 copies, postage prepaid | 7c each |
| 10-100 copies, postage prepaid | 6c each |
| 100 copies, postage prepaid | $ 4.75 |
| 500 copies, expressage collect | 20.00 |
| 1,000 copies, expressage collect | 35.00 |

### RADIO TALKS

The radio with its invisible audience offers an ideal medium for educational material. That dental health education has a definite place in the air is proved by the fact that broadcasting stations are continually asking dentists to give radio talks on various phases of mouth hygiene and preventive dentistry. In order to help the man who is too busy to write his own talk, the American Dental Association is planning to publish a booklet of radio talks. Any dentist who has given such talks and others interested in writing one of between 1,000 and 1,200 words are invited to send them to the office of the American Dental Association, Educational Department, 5 North Wabash Avenue, Chicago, Ill.

### LECTURE SERVICE

The Educational Department wants to develop a lecture service for dentists. There are many men who enjoy writing their own lectures, but there are many more who do not—men who would be glad to talk to a lay group if they could get a lantern, slides and an outline for a talk which they knew would be good. We want to be able to supply those men and also the many public health workers who are in constant contact with lay audiences but who have no dental background. Therefore, an appeal is made to dentists and to dental hygienists to send in lectures of between 3,500 and 5,000 words, which might be used with the following groups:

1. Kindergarteners
2. Grammar school pupils
3. High school pupils
4. Group of unintelligent adults
5. Group of intelligent adults (mixed audiences)
6. Mothers' clubs
7. Men's civic clubs
8. Women's clubs and parent-teacher associations
9. Trained workers (doctors, nurses)

All lectures will be submitted to the Committee on Mouth Hygiene and Public Instruction, which will choose one lecture to be used with each of the foregoing groups. Later, these will be illustrated by still pictures. Kindly send material to the American Dental Association, Educational Department, 5 North Wabash Avenue, Chicago, Ill.

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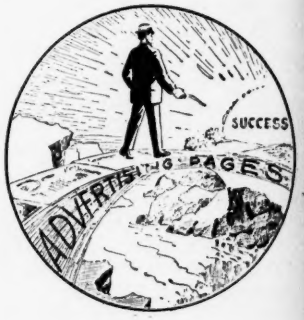
By ERNEST V. MADISON

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